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THE GORGE AND BASIN OF THE ZAMBEZI BELOW THE VICTORIA FALLS, RHODESIA.

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Introduction.—At the request of the Council of the British Association, I spent a few weeks in the summer of 1905 in examining the geological and physiographical features of the little-known country lying to the eastward and south-eastward of the Victoria Falls of the Zambezi river. My preliminary report on this investigation was read at the Johannesburg meeting of the Association in that year, and was subsequently printed.* More recently, I have dealt with the geological results in a paper published by the Geological Society of London;† and I have described the occurrence of stone implements, possibly of high antiquity, in this part of the Zambezi valley in another paper, contributed to the Anthropological Institute.‡

There still remains some geographical material that seems worth placing on record, though it is admittedly imperfect of its kind.

The primary object of my exploration was geological, and to this consideration all others were subordinate. During the necessarily rapid traverses, no time was found for strictly geographical work; and as the character of the country is such as to render accurate mapping peculiarly tedious and difficult, I had to abandon the idea of producing

* Abridged, in *Nature* for November 30, 1905 (vol. 73, pp. 111–114); and, fully, in *Rep. British Assoc. for* 1905, pp. 292–301 (London: 1906).

† *Quart. Journ. Geol. Soc.*, vol. 73 (1907), pp. 162–219, with map, and 7 plates from photographs.

‡ *Journ. Anthrop. Instit.*, vol. 36 (1906), pp. 159–169, with illustrations.

anything beyond a rough sketch-map.* It had been hoped that separate expert assistance might be obtained for the topographical work of the expedition, but this was not available in the event. Consequently, I can hardly do more than indicate where the representation of the country on the existing maps is incomplete or erroneous. In cartography, as in most matters, it is, indeed, much easier to criticize than to construct; and we shall probably have long to wait for a map of the region that will be accurate in detail.

My sketch-map here reproduced (Fig. 1) shows the routes that were traversed, and the approximate position of most of the localities mentioned in the following notes. As the method and circumstances of the traverses have been elsewhere described,† this information will not be repeated. It will be advisable, however, briefly to recapitulate the ruling factors in the physiography and geology of the region before describing the present aspect of its surface.

The country to be dealt with is a small portion of the vast South African plateau which has been deeply notched by the erosive activity of the Zambezi and its feeders in their rapid descent towards the Indian ocean. North-west of the Deka river the whole area within the sketch-map is underlain by a series of basaltic lava-flows, known as the "Batoka Basalts," which are probably of Mesozoic age. The course of the Deka river coincides approximately with the line of a great fault—the "Deka fault"—which brings in older rocks abruptly on its south-eastern side. These rocks consist of sandstones and shales with coal-seams which I have named "the Wankie series." On the south-east side of the Wankie coalfield, this series is seen to rest unconformably upon the oldest rocks of the country, a very ancient metamorphic and igneous complex. Where the plateau is still unbroken, these "solid" formations are generally overlain by superficial deposits of sand, "surface-quartzite," and other kindred materials, which are of much interest because of the evidence they afford for great changes of climate during comparatively recent periods.

Previous Exploration.—The course of the Zambezi river from its mouth up to the confluence of its tributary the Deka has been frequently traced;‡ and it has twice been followed up from the Victoria Falls to one of its main sources.§ But the routes described in published travels

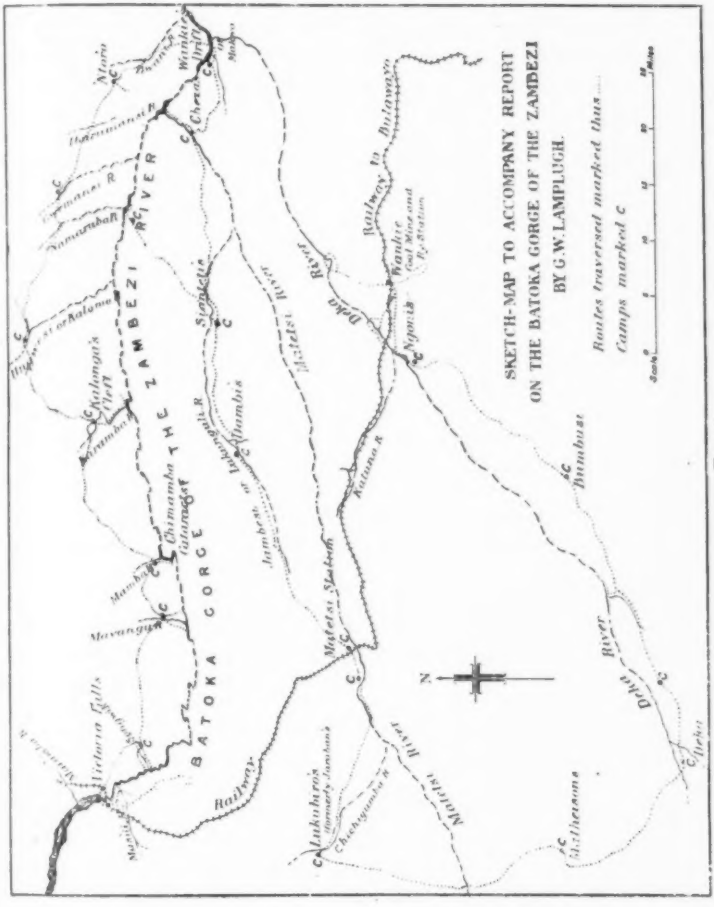
* I have traced out my route in manuscript, by compass bearings and dead reckoning, to the scale of 1 inch = 1 mile; but the result is unsatisfactory, from want of points fixed with precision.

† *Rep. British Assoc. for* 1905, pp. 292–296.

‡ The most systematic geographical exploration of recent date is that of Major A. St. H. Gibbons and his companions in 1898–1900, described by Major Gibbons in 'Africa from South to North, through Marotseland' (London: 1904).

§ By Major Gibbons (*supra cit.*), and by Colonel Colin Harding ('In Remotest Barotseland.' London: 1905).

have all swung away from the river, either to northward or southward, for the space of about 70 miles, between the Deka confluence and the Falls. For about 55 miles of this distance, measured directly, the Zambezi speeds tortuously in a rock-bound cañon through an excessively rugged wilderness, vigorously described by one traveller who entered its


SKETCH-MAP TO ACCOMPANY REPORT
ON THE BATOKA GORGE OF THE ZAMBEZI
BY G.W. LAMPLUGH.
Routes traversed marked thus
Camps marked c
Scale
ZAMBEZI RIVER
BATOKA GORGE
Victoria Falls
Railway
Railway to Buluwayo
Matetsi Station
Matetsi River
Deka River
Deka
Nyamandhlovu R.
Damarabah R.
Kalomo's Kraal
Chamaba
Chief
Sinamwenda
Sinamwenda R.
Jumbo
Jumbo or Zambesi R.
Kafuma R.
Mapani
Mapani or Kalomo R.
Maranga
Mashaba
Mashaba R.
Lukabarosi
Chief
Chief Lumbusu
Chief Mapani
Chief Sitheanga
Sitheanga
Nyamandhlovu
Coal Mine and Rly. Station
Wankie
Wankie Coal Mine
Wankie R.
Chief
Mosi
Mosi R.
Mosi or Zambesi R.
Mosi
Mosi R.
Mosi or Zambesi R.
Mosi
Mosi R.
Mosi or Zambesi R.

of access, very little information has been forthcoming with respect to any other part of it. David Livingstone, in his second journey from the Falls, in 1860, gained a glimpse of it in two places from the north bank; * and in 1870, Edward Mohr reached its brink from the south at a vaguely indicated spot somewhere between the Matetsi river and the Falls.†

It was not until 1902 that the first steps were taken towards a systematic investigation of the "Batoka Gorge" (the name that seems most fitting for the cañon). In that year Mr. F. W. Sykes, who until recently held office under the British South Africa Company as District Commissioner and Conservator at Victoria Falls, traced the gorge continuously eastward as far as the Tshimamba cataracts, and also, with much difficulty, reached it at two or three points between these cataracts and the confluence of the Karamba river, which lies some 35 miles east of the Victoria Falls. The report in which Mr. Sykes described his investigation has not been published; but by the courtesy of the Directors of the British South Africa Company, I was provided with a copy of it before starting on my journey, and by their further courtesy I am permitted to quote passages from it in the descriptions which follow.

It was to my inestimable advantage that I was granted the personal guidance and companionship of Mr. Sykes in my own investigation of the country bordering the gorge on its northern side; and I was similarly aided in my later traverses of the country south of the Zambezi by the local knowledge and leadership of the late Mr. H. F. Greer, who at that time held the post of Assistant Native Commissioner at Matetsi.

The singular character of the cañon immediately below the Victoria Falls lent support to the original idea of David Livingstone that it was a veritable crack arising from a sudden rending of the earth's crust, and this idea has been reiterated by most of the travellers who followed him. It was pointed out, however, more than forty years ago, by Sir Archibald Geikie,‡ that the gorge had more probably been developed simply by the erosive force of the river itself; and this explanation was fully established by the evidence brought forward three years ago by Mr. A. J. C. Molyneux in the pages of this *Journal* § as the result of his personal examination of the head of the gorge. Every part of the cañon that I visited bore out the conclusion that it is a valley of

* 'Narrative of an Expedition to the Zambesi and its Tributaries' (London: 1865), p. 308.

† 'To the Victoria Falls of the Zambesi' (Eng. transl. London: 1876), pp. 317–318.

‡ In the *first* edition of his 'Scenery of Scotland' (London: Macmillan. 1865), p. 33 and footnote.

§ "The Physical History of the Victoria Falls," *Geogr. Journ.*, vol. 25 (1905), pp. 40–55.

FIG. 2. The first reach of the Batoka Gorge below Victoria Falls (before the railway bridge was built).
(*Photo by F. W. Sykes.*)

erosion; and I found excellent illustrations, elsewhere described,* of the mode in which the curious zigzags are developed, both in the main gorge and in its laterals, through the differential excavation that ensues where vertical planes of weakness traverse the rocks.

The General Aspect of the Gorge.—The Batoka gorge offers many attractions both as a spectacle and as a field for scientific research of various kinds. My own investigation included only so much of the cañon as sufficed to assure me of the continuity of its geological structure, together with the main outlines of its physical aspect.

The impressive perpendicularity of the walls in the upper reaches of the gorge seems, at first sight, to render access to its floor impossible except by artificial aid (see Fig. 2); but even in this part there are recesses which are in varying degree practicable for descent. Thus in the eastern angle of the chasm that forms the very beginning of the gorge, I managed, by slightly hazardous scrambling, amid heavy showers of spray, to reach the water's edge at the actual foot of the Victoria Falls; and the easy pathway down the Palm kloof, the next eastern angle of the cañon, is well known to all visitors. There is, again, not much difficulty in descending to the eastern side of the river at the little beach of white sand that lies within the acute bend south of the railway-bridge. Then follows a stretch of a few miles where the walls appear to be comparatively unbroken; but even in this portion it is probable that clefts practicable to the skilled climber will be found, for there is much intricacy of detail in the cliffs, in spite of the simplicity of their general contour.

As their distance from the Falls increases, the sides of the gorge become steadily less steep, owing to the more prolonged weathering which they have undergone, so that after the first 10 miles or so their aspect is no longer conspicuously formidable. They are, however, still dangerous, because broken at intervals by difficult "kranzes," or belts of crag, often deceptively foreshortened when viewed from above, and partly hidden by the growth of scrub on the slopes between them (Fig. 3). These crags mark the outcrop of the massive basalts, while the intervening bush-clad slopes conceal the bands of more perishable slaggy breccia which have formed the ancient surfaces of lava-streams.

But the main obstacle to the exploration of the middle and lower parts of the cañon lies in the difficulty of reaching its brink amid the maze of branching ravines gouged out by the tributary streams, whereby the country bordering the gorge is rendered untraversable. The Zambezi, in carving its low-level trench backward into the great plateau, has revived the erosive capacity of its tributaries one after another as the

* "The Geology of the Zambezi Basin around the Batoka Gorge," *Quart. Journ. Geol. Soc.*, vol. 63 (1907), pp. 187–192.

beginning of its gorge retreated past their mouths, so that always the mature system of drainage above this critical point has given place to a very vigorous "rejuvenated" system immediately below it. The

FIG. 3.—BATOKA GORGE, ABOUT 15 MILES EAST-SOUTH-EAST OF THE VICTORIA FALLS.
(*Photo by F. W. Sykes.*)

forcefulness of this rejuvenation is impressively demonstrated by the difference between the shallow valleys of the tributaries above the Victoria Falls and the gloomy chasms through which the feeders below the Falls gain confluence with the Zambezi. The length of these chasms is a rough measure of the time which has ensued since the main gorge was opened to their streams. Hence, the farther we descend from the present head of the Batoka gorge the longer and more numerous do the subsidiary ravines become, and the more thorough and intricate is the dissection of the plateau. At last hardly a vestige of the unbroken plain is left, and the country for some distance on both sides of the Zambezi is a bewildering network of craggy ravines and bush-clad ridges, parched and desolate during the dry season and lashed with torrents during the rains.

The depth of the Batoka gorge increases persistently eastward down to its termination a few miles above the confluence of the Matetsi river. The plateau itself falls steadily in the same direction, but the descent of the Zambezi within its trench is still more rapid. In fact, in the Victoria Falls the river has only well begun its active work, which it afterwards pursues relentlessly throughout the gorge; and the frequent occurrence of rapids, with at least one bold cataract, presently to be described, is sufficient evidence that the deepening of the cañon is still in progress. At the Victoria Falls the chasm, to mean water-level, is 360 feet deep; at the confluence of the Songwi stream, 6 miles below, the depth from the crest to the floor of the gorge, according to my measurement by aneroid, is about 460 feet; at the Chimamba cataracts, some 20 miles farther eastward, about 650 feet; and at the Karamba confluence (see map, p. 135) about 800 feet. The level of the Zambezi at Makwa,* near the mouth of the Deka river, appears to be about 1100 feet less than its level just under the Victoria Falls (see p. 135), so that the river, in passing through the Batoka gorge, loses in altitude thrice as much as it loses in its first plunge from the plateau.

The enormous augmentation of the Zambezi toward and just after the close of the wet season, while deepening the water considerably even on the broad upper river, has its greatest effect when the mile-wide stream is suddenly concentrated within the narrow confines of the gorge. In some spots we saw evidence of floods rising up to 50 feet above the dry-season level, besides covering the whole floor of the cañon in places where the channel of the river during the drought occupies only one-seventh of the total breadth of the floor. I have

* I have proposed that Major Gibbons' name "Makwa" be adopted for the place on the south bank of the Zambezi, a little above the Deka confluence, instead of the older name "Wankie's drift," in order to avoid confusion with the well-known place on the railway, some 35 miles distant (see *Quart. Journ. Geol. Soc.*, vol. 63, p. 167, footnote).

elsewhere discussed the potency of this extreme seasonal variation * in producing the peculiar features that characterize the cañon.

The broad platforms in the bottom of the cañon, dry during the low-water stages of the river, are of course directly due to this variation. It is difficult to realize the spaciousness of these platforms until one comes actually to traverse them, and then they seem indeed strangely disproportionate to the shrunken river.

It is, I think, from these platforms that one gains the most impressive views of the cañon, for they provide standpoints well away from the impending walls, and therefore giving open vistas. Not that the scenery of the gorge is possessed of much loveliness—usually it is stern, with a savage sternness. But there is that of strangeness in it, and of variety in detail grafted upon simplicity in outline, that grips the imagination.

However varied in foreground, the general features of the vista seen from the flood-platform is always the same: rugged ledges of black basalt underfoot, with the opaque green river pouring swiftly along its narrow channel in a string of eddying coils, and bursting tumultuously here and there into white rapids; along the outer borders of the flat, a broad fringe of glossy black boulders, with here and there a patch of glaring sand, marking the flood-limits of the river; behind the boulders, a narrow belt of trees in full dark-green foliage; and above, hemming in the view, the grim rusty-brown or purple krantzes and alternating slopes, clad at the dry season with faded scrub and trees, rising grandly up to the even edge of the plateau.

Where the river deigns to follow the direction of the main fracture-lines of the rock, the vista remains for a space remarkably straight and regular. But where the joints and other vertical fractures of the basalt lie athwart its course, the Zambezi swerves sharply to and fro in its struggle to cross the harder barriers, and the sides of the gorge are notched into zigzagging spurs that break down irregularly into sharp arrêtes and pinnacles, often so complex and overlapping from every view-point that the eye is baffled by their intricacy. In such places—as, for example, just below the confluence of the Songwi (Fig. 4)—the river seems to plunge into a tangle of rock and disappear, and even from the crest of the gorge its doublings are hidden from view, so that patches of water gleam perplexingly from the depths in unexpected spots. The native report mentioned by Schulz and Hammar,† that the Zambezi in one place ran underneath the rocks, was perhaps based on some such apparent disappearance of the river.

It is in these sinuosities that the scenery of the gorge attains its greatest diversity and interest; and these portions also best deserve

* *Op. supra cit.*

† 'The New Africa,' etc. (London: 1897), p. 41.

detailed examination from the light which they throw upon the past conditions of the river.

In its minor features the flood-platform resembles the foreshore of a craggy sea-coast. Terraced reefs and irregular bosses of rock, sometimes high enough to form islands at flood-time, roughen its surface; and it is deeply pitted with well-like "pot-holes," ground smooth and true by the rock-drill of whirling torrent-driven stones. The amygdaloidal structure of the basalt is peculiarly favourable to the production of

FIG. 4.—THE FLOOD-PLATFORM IN THE GORGE OFF THE MOUTH OF THE SONGWI, LOOKING SOUTH.

(*Photo by Colonel F. W. Rhodes.*)

these pits, which, by their numbers and size, are a striking characteristic of the floor of the gorge in many places. The more shapely are circular in plan, and I measured some that ranged up to 6 feet in diameter, and up to 12 feet in depth. At the time of our visit a few still held water, but most were dry, and sometimes contained a little sand among the round grinding-stones, along with delicate fresh-water shells which must have been either wafted in by the gentler current of the subsiding flood, or nurtured in the slowly evaporating waters of the pits after their last filling.

Besides these "pot-holes," the flood-platform occasionally holds broad deep pools, ranging up to the size of a small mountain tarn. Such pools occur in most cases at or near the mouths of the tributaries, and the hollows which they occupy have perhaps been initiated by the cataracts which originally descended from the "hanging valleys" of these tributaries, being subsequently maintained and deepened by the annual flood-scour. A pool of this kind at the great bend near the Songwi is shown in Fig. 5. At the time of our visit it was about 80 yards wide and 200 yards in length; a massive crag rose precipitously from it at one side to a height of 30 or 40 feet, while on the opposite side it was separated from the Zambezi by a low rock-barrier 60 yards wide, against which was banked a steeply sloping beach of white quartz-sand that, like most of the sand-patches of the gorge, gave out a sharp screech when trodden. The depth of its dark waters at the foot of the crag was certainly great, but we failed to obtain a sounding. The streamlet from the side gorge of the Songwi trickled into the pool through a broad fringe of flood-carried boulders, but was insufficient to balance the loss by evaporation, as progressive shrinkage was shown by the series of water-stains on the bordering rock. We saw at first numerous big fish and a crocodile in this pool, but they sank out of sight when we approached it, and the smooth gloom of its surface contrasted strangely with the wild energy of the great river that roared near by.

Sometimes at the mouth of a tributary the pool is replaced by a narrow water-filled inlet that runs across the flood-platform straight from the main river for some little distance up into the side gorge, as shown in the sketch-plan, Fig. 8. Along with certain other features of the cañon-floor, this is attributable to the fact that the Zambezi does not attain its high flood-level until toward the close of the rainy season, so that the earlier spates of its feeders in the Batoka country occur while the platform is still bare. Therefore, when a tributary happens to have struck along a plane of easy erosion, it sinks its trench clear across the platform to the low-water channel of the river. Later, when the Zambezi rises to its height, while its tributaries are already shrunken and feeble, the main flood surges up far into the mouths of the lateral chasms.*

I have no doubt that the animal and plant life that lies sheltered within the gorge and its branches would well repay systematic study, and I regretted my inability to deal with it. Always on descending into the cañon one was struck with the difference between the upper and the under world: the plateau, parched into seeming lifelessness by the long drought, enduring the full glare of the sun during the day and the

* This appears also to be the condition described by Chapman as existing at the confluence of the Gwai river ('Travels,' etc., vol. ii. p. 194). His description puzzled me greatly when I read it before visiting the gorge-country.

chill radiation of the night, its streams dry or merely trickling, and its vegetation sere and grey; the gorge, some hundreds of feet below, full of deep cool shadow in the daytime, and at night gaining warmth and shelter from its lofty barriers, its waters always plenteous, and its trees in full foliage.

Indeed we may look upon the cañon as an inlet of the low country reaching back into the plateau, and the investigation of its fauna and

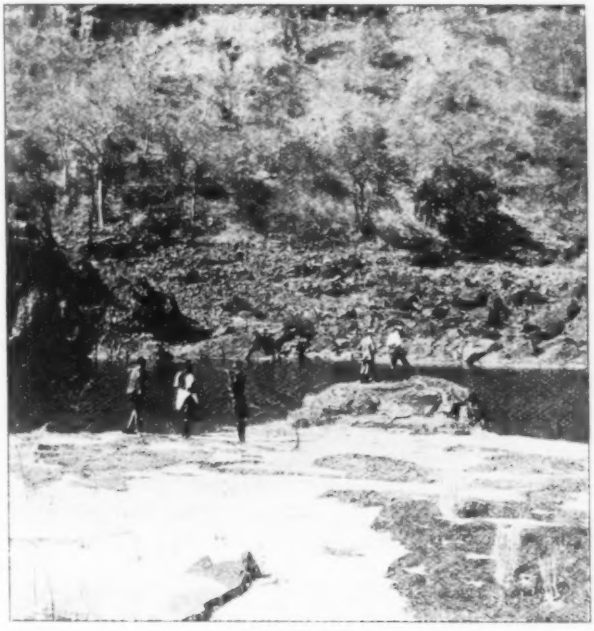


FIG. 5.—BIG POOL ON THE FLOOD-PLATFORM IN THE GORGE AT THE SONGWI CONFLUENCE.

(*Photo by Colonel F. W. Rhodes.*).

flora is likely to bring out this relationship. In its upper reaches we saw no traces of the larger mammals except the baboon, but to the eastward of the Chimamba cataracts the hippopotamus frequents the river, and antelope of various species enter the gorge, though apparently they are not numerous. In one spot only, opposite the mouth of the Namaruba river, we saw the spoor of lion on a patch of sand in the cañon.

The peculiar cloudy green colour of the river when viewed from the crest of the gorge, which has impressed most observers, is probably due to the presence of minute organisms nurtured in the placid reaches

above the Falls. It is not noticeable until the waters are concentrated within their deep channel below the Falls, and is most marked in the upper part of the cañon, becoming gradually less conspicuous in the lower reaches. We may therefore suppose that the colouring agent is partly eliminated by the swift current and aërating rapids of the gorge.

The great valley appears to lose its gorge-like character rather abruptly at a few miles above the confluence of the Matetsi river, and thereafter the Zambezi flows for several miles through a more open valley, bounded on both sides by comparatively low and irregular hills, which represent merely the stump of the much-dissected plateau. I was unable to reach the place where the change occurs, but on looking north-westward from the broad bar of rock and boulders that juts out into the Zambezi at the mouth of the Matetsi, I could see the broken edges of the high plateau converging upon the river from both sides within a few miles, while toward me they lost their definiteness and retired as a background to the undulating lower country bordering the river. At the spot some 10 miles farther up, where I reached the Zambezi from the south (see sketch-map, Fig. 1), it had not yet left its profound trench, that showed as a clean-cut notch in the plateau.

It is especially noteworthy that this change in the shape of the valley is not dependent upon a change in the character of the rocks, for the basalts are continuous right down to Makwa, the eastward limit of our journey. The lowering of the country near the river seems to be due, as will presently be shown, mainly to the erosive energy of several important tributaries, which, during the long interval since their low-level drainage was established, have carved out overlapping basins, and have left few remnants of the original plateau in the vicinity of the main river.

Suggested Reservation of the Batoka Gorge.—The excellent policy of the Governments of the United States and Canada in reserving tracts of natural grandeur or peculiarity from settlement or from proprietary rights of any kind, and in stringently protecting the wild life of such tracts, is now so well recognized and so widely adopted in our colonies, that it is needless to discuss its advantages. This policy has, I believe, been already applied by the Administrators of the British South Africa Company to the immediate surroundings of the Victoria Falls; and it should, in my opinion, be extended to cover the whole belt of country bordering the Batoka gorge and eastward up to the mouth of the Matetsi river.

The tract is not one in which minerals of economic value are likely to occur; the natives within its precincts are very few; its agricultural capabilities are slight compared with those of the vast adjacent areas that still await settlement; and its extreme ruggedness, while rendering

it unattractive to the sportsman, might long give shelter to the animals that inhabit it, especially to the hippopotamus. The increasing resort of tourists to the Victoria Falls opens the prospect that the gorge will before long be included in some "grand tour of the Zambezi," and it is therefore advisable that the country should be protected before private rights are acquired, as elsewhere has occurred, that might be difficult afterwards to annul.

I am fortunately able to add that, through the willing co-operation of Sir Lewis Michell, this suggestion has already been brought before the Directors of the British South Africa Company, with favourable result; and I am informed that steps are being taken to bring it to practical effect.

It would not need much labour to clear some rough tracks through this pathless country, by which, at any rate, the upper part of the gorge might be made quite easily accessible. The leisurely visitor might then find pleasure and interest in its wild scenery, which contrasts so sharply with the placid aspect of the country above the enchanting falls.

Description of Particular Portions of the Gorge.—From the shape of its walls, we may infer that all the upper portion of the gorge, for many miles, has been dug out nearly to its present depth by the descent of the Zambezi from the lip of the plateau either, as now, in a single grand plunge or in a succession of cataracts so closely connected as to have practically the effect of a single fall; and that the deepening which has since ensued, and is still in progress, has been of secondary consequence.

If the cañon had been excavated gradually, one should have found the successive stages indicated by ledges or terraces high above the present stream, whereas in the parts examined hardly any trace of old river-terraces was seen, the slopes, as shown in Figs. 3 and 7, being generally regular from crest to floor, except where the usual trap-like features have been developed in the basaltic lavas by subaërial weathering. The only place where a definite shelf was noticed within the cañon was between the acute elbows of the river just below the Chimamba cataracts (see left-hand side of Fig. 9). This shelf was inaccessible to me, but it appeared to lie 50 or 60 feet above the dry-season level of the Zambezi. I believe that it marks the prolongation of the thick bed of dense basalt across which the river now plunges at the lower Chimamba cataract, and that it is due to the recession of this powerful cascade.

Of the frequent splitting of the river into separate branches in its precipitous descent, just as it is now divided by the islands on the lip of the Victoria Falls, there are indications in several parts of the gorge. These conditions have prevailed wherever the river has crossed any belt in which vertical planes of structural weakness are numerous. Its waters in such places have simultaneously carved parallel or interlacing trenches along the several planes, until the more rapid recession of

some particular trench has again collected the river into a single channel.* Where this has occurred, the sides of the gorge are diversified by high pinnacles and ridges, separated from the main crest by deep precipitous notches and troughs which are the relics of the abandoned channels.

There is a readily accessible example of this subsidiary sculpturing in the zigzags below the Victoria Falls, only about a mile south-east of the hotel, at the end of the second spur on the western side of the river. This spot attracted the notice of several of the early travellers, and is described, and embellished, by Holub.† Here, the true brink of the cañon is rendered inaccessible for 500 or 600 yards by a steep-walled trench, 60 or 80 yards wide and 80 to 120 feet deep, which cuts off a narrow ridge along the rim of the main gorge, as shown in the birds'-eye view Fig. 6. The northern end of this ridge rises perpendicularly in a flat-topped kopje to the general level of the crest-line, but the remainder of it is irregularly broken by transverse gaps, and is terminated southward by a sharp swerve of the trench which then ends as a "hanging valley" in the walls of the cañon.

The peninsulas below the Songwi confluence 6 miles from the Victoria Falls show analogous features, softened and modified, however, by their much longer endurance of subaërial weathering.

It was at the mouth of the Songwi that we first descended into the gorge in our journey eastward. Mr. Sykes had previously explored this place, and gives, in his unpublished report, the following graphic description of the circumstances of his first visit:—

"With the exception of two old men, Namakabwi and Kalonga, the natives professed entire ignorance of all details necessary to assist one in viewing the gorge from consecutive points, so that it was only after constant checks and much labour that these were ultimately reached. . . . The Songwi is a lively little stream with deep pools, heading from the great open piece of country below Makoni's kraal. Following down its right bank along a well-defined track, and later on branching away still further to the right, the gorge is reached in about $2\frac{1}{2}$ miles. . . . The picture as presented from above [from the crest beyond the Songwi] is a striking one. Coming down a long straight reach with rapids showing up white here and there, the river enters into a perfect maze of intricate windings caused by promontories and buttresses of rock jutting outward from either bank, with island kopjes in the middle. One has to look more than once to discover what course the river actually follows. . . . With Namakabwi as guide, we descended by a zigzag path the towering face of the gorge wall [in a recess to the right of the Songwi confluence]. Huge masses of overhanging rock, seemingly on

* Cf. A. J. C. Molyneux, *Geogr. Journ.*, vol. **25** (1905), pp. 51–53.

† 'Seven Years in South Africa' (Engl. transl. London: 1881), vol. **2**, p. 198.

the verge of toppling over, were passed during the descent. When about three parts of the way down, Namakabwi, the Old Man of the gorge, pointed out a cave partly hollowed out by nature and partly by hand. During a portion of the year when the water is low, he occupies this place, living on the different varieties of fish to be found in the still pools adjoining the main stream below. . . . Descending into the gorge-bed, we clambered over huge basalt boulders worn by the action of the water to a glassy smoothness, across patches of fine white sand,

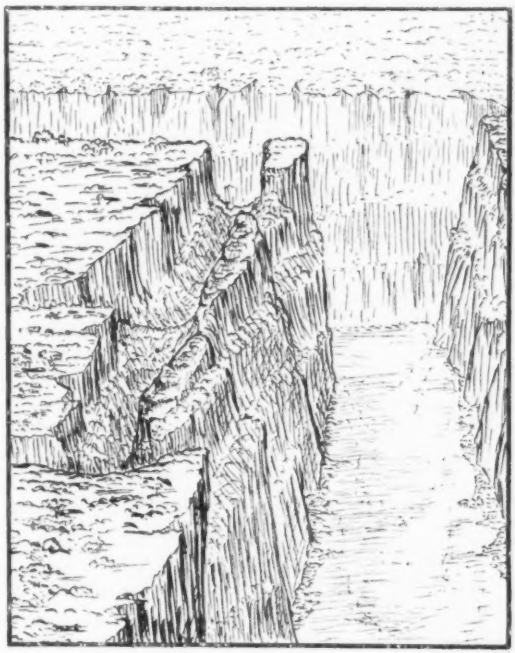


FIG. 6.—BIRD'S-EYE VIEW, SHOWING AN ABANDONED CHANNEL ON THE CREST OF THE BATOKA GORGE, 1 MILE SOUTH-EAST OF VICTORIA FALLS HOTEL.

finally reaching the edge of the river. Here it comes rushing down at a great pace, swerving off at a tangent on meeting an opposing wall, thence, after swirling, eddying, and boiling, in a couple of hundred yards it is forced backward in an opposite direction to its original course, and finally disappears round the corner of a perpendicular wall towering upwards nearly 500 feet. . . . This locality was a favourite place of refuge in the old days."

The tarn-like pool on the flood-platform at this place has previously been described (p. 142). At the time of our visit, in July, we found the Zambezi pent within a dry-season channel that narrowed at one spot to a width of not more than 30 yards, while its flood-bed was fully six times this width.

From the bottom of the gorge we obtained access to the ravine of the Songwi, and pushed up its boulder-strewn bed, or through the dense wooded tangle that crowded the narrow space between its impending cliffs. But after about a mile, our progress was barred by a precipice which in the wet season must support a magnificent cascade, of about 80 feet, falling into a deep pool. The evaporating water of the stream had covered this precipice with a thick cushion of tufa, which was spongy with moisture and supported a rich growth of moss and fern, the brightness of whose verdure was enhanced by the sombre hues of the shadowed pool below and of the basalt cliffs above. On our way, we had found the remains of a young crocodile, a couple of feet in length, whose broad head was firmly wedged between two rounded boulders on which it had lost its grip in crawling up the gully; and the forbidding pool under the green-curtained cliffs looked a fitting shelter-place and nursery for such reptiles.

During his previous journey, Mr. Sykes had worked along the edge of the gorge east of the Songwi, but had found his progress impeded by numerous deep ravines. In his report he mentions that "at Chisonsi [near the mouth of a tributary of that name] the gorge-walls shelve downward less abruptly than formerly, in places rendering access to the river from above comparatively easy;" and that "between Chisonsi and Mavangu, the river becomes exasperating to follow owing to its sharp curves and generally sinuous course, and the exceptionally rough country to be traversed." From the different arrangement of the tributary-drainage on the southern side of the river, to be presently described, I am inclined to think that a somewhat less arduous route would be found if the gorge were attacked from that side.

We swung away northward to avoid this broken ground, and bore back to the crest of the cañon again at the mouth of a short impermanent stream, the Mavangu, about 11 miles east-south-east of the Songwi. Here, at a place called Syakowi by the natives, the river holds a straight eastward course for about $\frac{3}{4}$ mile, beyond which, in both directions, it curves sharply out of sight. The gorge, as shown in the photograph, Fig. 7, is remarkably trench-like and regular, with an even sky-line of plateau beyond. Its width from crest to crest, if my measurement with a range-finder be trustworthy, is approximately 400 yards.

On leaving the Mavangu, we again swung round the dissected country and intercepted the Zambezi next at the Chimamba cataracts, about 8 miles farther eastward. At this point the river, after having described an irregularly angular loop to the southward in its general

easterly course, is making back to the north. Mr. Sykes had previously seen something of the intervening country, having camped on a small stream called Kasya near the gorge, about halfway between Syakowi

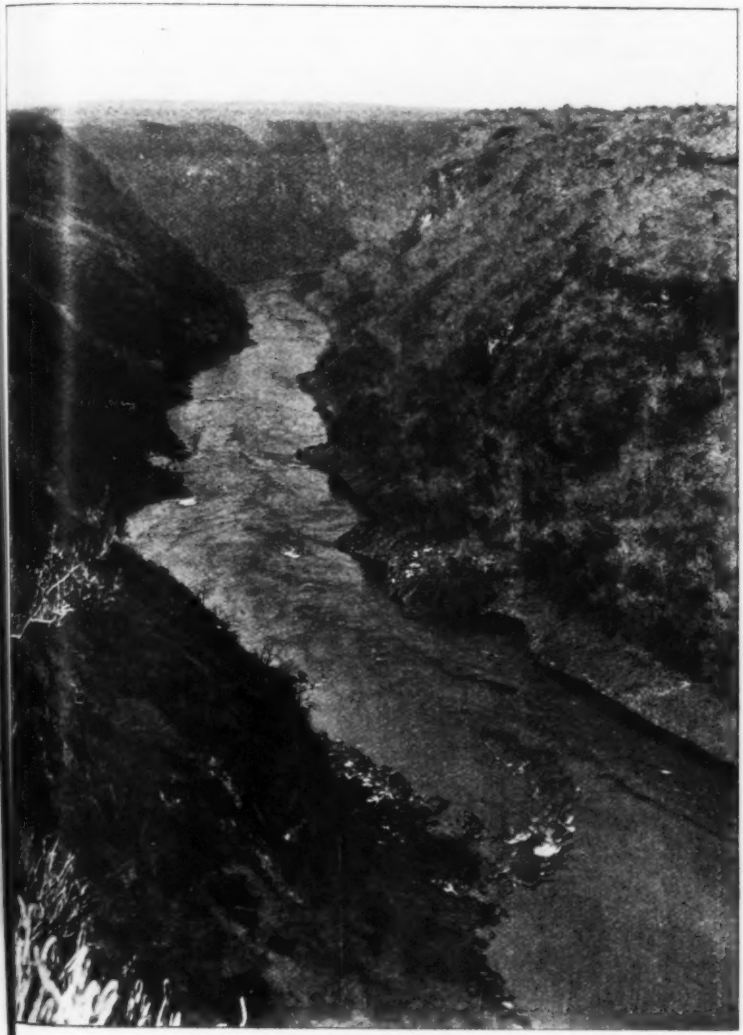


FIG. 7.—BATOKA GORGE NEAR THE CONFLUENCE OF THE MAVANGU.

(*Photo by F. W. Sykes.*)

and Chimamba,* and he writes, "From Kasya to Chimamba is about 8 miles. In between are the Sililevu rapids and a section of very broken country, so that only a glimpse of the river in its serpentine course can be obtained here and there."

Chimamba is the more easterly of the two spots previously mentioned as having been visited by Livingstone in 1860. He diverged from his homeward route along the northern plateau on the native report of a waterfall in the gorge called "Moōmba, or Moamba," the description of which "seemed to promise something grand." But, with the memory of the Victoria Falls fresh in mind, he was disappointed:—"When we

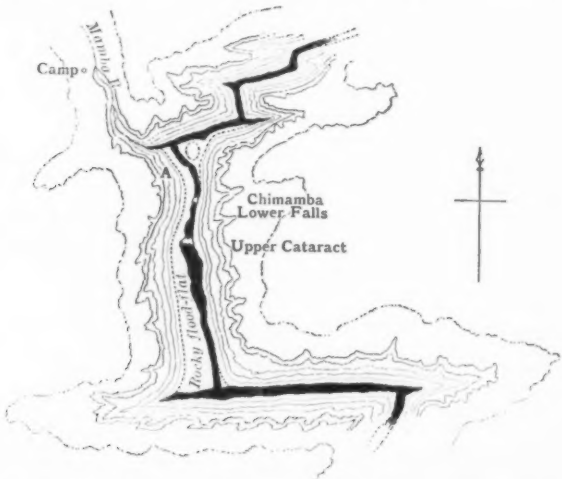


FIG. 8.—SKETCH-PLAN OF THE BATOKA GORGE AT THE CHIMAMBA CATARACTS.
The water-area at the dry season is shown in black.

looked down into the cleft in which the dark-green narrow river still rolls, we saw, about 800 or 1000 feet [about 650 feet, see p. 139] below us, what, after Mosi-oa-tunya, seemed two insignificant cataracts." †

Insignificant in height, it is true; but when one stands on the brink of the lower cataract and sees the whole volume of the great Zambezi converging into a single pass only 50 or 60 feet in width, shuddering, and then plunging for 20 feet in a massive curve that seems in its

* This word has been transliterated *C*himamba in accordance with the rules of the R.G.S. The author, following the custom prevalent in the country, wrote of Tshimamba in his previous papers. The same alteration has been made in the names Tshisonsi, Tshitshigamba, etc., which appear later in the paper. The *s* has also been changed to *z* in Zambesi, Gwemansi, etc.

† 'Narrative of an Expedition to the Zambesi,' etc., p. 308.

impact visibly to tear the grim basaltic rocks asunder, one learns better than from the feathery spray-fans of the Victoria Falls what force there is in the river, and one wonders no longer at the profundity of the gorge!

I will quote Mr. Sykes's description of the surroundings. "The Chimamba rapids are situated just above the junction of the Mamba river with the Zambezi. This stream, when running, flows from a north-westerly direction through a steep gorge into the main channel. From the point of the promontory formed by the Mamba inlet and the main river a commanding view opens up, embracing the sluggish waters above the rapids, then the rapids and cataract, and toward the east a long reach with islets and broken water, terminating in the inevitable corner (see sketch-plan, Fig. 8,* and panoramic view, Fig. 9).

"Descending into

FIG. 9.—PANORAMIC VIEW OF THE BATOKA GORGE AT THE CHIMAMBA CATARACTS.
(*Photo by F. W. Sykes.*)
The outlook ranges from north (left-hand) by east (centre), to south (right-hand). The position of the view-point is marked *A* in Fig. 8.
The white patches above water-level in the gorge are tracts of dry sand.

* Reproduced from *Quart. Journ. Geol. Soc.*, *supra cit.*, p. 189.

the main gorge from the south side of the promontory, a steep and arduous climb brings one down to the upper portion of the gorge-bed of smooth shiny boulders, which at high water is covered with the flood. On in front the river, after tumbling over a succession of rapids, is turned off at a sharp angle towards a narrow gut not more than 25 yards in width, through which it spouts with terrific force into a semicircular basin (Fig. 10).

"After *the* Falls, it is, perhaps, somewhat a misnomer to dignify the Chimamba cataract by calling it a "fall," though there is certainly an abrupt drop of about 20 feet, and a miniature spray-cloud, with a rainbow, floats over the basin into which the water is hurled.

"The outlet from this basin is nearly at a right angle to the fall. When it is remembered that the whole of the wide Zambezi is compressed into this incredibly small area, and that a fall and two sharp angles add their influence to the pent-up force of the waters, some idea may be gathered of the swirl and fury concentrated within the low confining walls of vertical rock. Standing near by, one can feel a perceptible vibration beneath one's feet, as the surge every now and then exhibits a spasm of extra violence."

(*To be continued.*)

NOTES ON A JOURNEY FROM BANDAR ABBAS TO SHIRAZ VIÂ LAR, IN FEBRUARY AND MARCH, 1907.*

By Lieut. A. T. WILSON, 32nd Sikh Pioneers, I.A.

Section I.

Bandar Abbas to Lar.

That portion of South Persia which lies between Bandar Abbas and Shiraz is so little known and has been described so scantily by travellers and geographers in the past, that the publication of the following notes on this region requires no justification. No scientific inquiry has ever touched this portion of Persia, and existing maps are conspicuously inaccurate. The route described below is that *viâ* Lar and Jahrum. Although now only used for local traffic,† it was once one of the great trade routes of Persia, and the little Shah Abbas caravanserais all along the route testify to the importance attached by the greatest king that Persia has had in recent times to this road.‡

As regards Bandar Abbas, the starting-point of the journey, nothing need be added to the exhaustive account given in Curzon's 'Persia,'§

* Map, p. 244. Photographs by Lieut. A. H. P. Cruickshank, 32nd Sikh Pioneers, I.A.

† Sykes, '10,000 Miles in Persia.'

‡ Curzon, 'Persia.'

§ Ibid.

supplemented by some notes by Major Sykes which appeared in a recent number of this *Journal*. A new British consulate, planned on a scale worthy of the dual government which its occupant will represent, is rapidly approaching completion; it is built, by a strange irony, of stone extracted from the very foundations of the ancient city of Gombrun, on Hormuz Island, the focus of Portuguese activity in the Far East before the current of British commerce and conquest had set eastwards.

Leaving Bandar Abbas, the road to Lar runs along the coast in a westerly direction for some 15 miles, touching a few date groves here and there, and often crossing the dry beds of torrents which take their rise in the hills to the north. The "raised beach" formation, so con-

GACHIN PLAIN. KUH-I-GINAO IN DISTANCE.

spicuous at Bandar Abbas, gradually disappears as one goes westward, and ends altogether about 15 miles west of Bandar Abbas. At the desolate serai of Chesterneh the road turns abruptly west through the Tang-i-Chakabak. A curious illusion was here produced by the salt efflorescence remaining in the dry bed of the torrent which runs through the pass: until within a few hundred yards, the white salt looked exactly like the foam of water, so naturally does it lie in the hundred channels occupied in flood-time by the water.

Traversing a desert valley bounded on north and south by low hills of grey marl, topped with Tertiary gravel beds of great hardness and at varying angles, the scattered village of Gachin is reached, surrounded by date groves. The boundary between Lar and Bandar Abbas districts runs through this village, a portion lying in each of these districts. Six miles to the north Kuh-i-Namak-i-Angaru rises steeply; it is a typical instance of the occurrence on the mainland of the "Hormuz formation

of igneous rock of a reddish colour, associated with rock-salt." * The latter, dissolved and deposited in the ravines that furrow the red slopes of the hill, has formed long scars of a brilliant whiteness, which makes the hill easily recognizable at first sight. This formation, although sufficiently uncommon to attract notice wherever seen, is not so rare as have been supposed. It occurs in the hills bounding the Aliabad plain to the south, 20 miles east of Lar, and also east of Biris and elsewhere.

In colour the reddish shales contrast strongly with the sandy-browns of the surrounding hills, whilst in shape, this formation occurs in vast knolls on a circular base, in the middle of a hill composed of brown Tertiary gravels or sandstones, from below which latter it appears to have forced itself, overspreading on either side the edges of the cup thus formed. A similar formation is also found south of Gachin. Twelve miles east of Gachin the road crosses the Shor river by a treacherous ford. This river should be of peculiar interest to geographers. No two maps agree as to its course, which has yet to be explored. After an exceptionally dry season, it was 60 yards wide, and 2 feet 6 inches deep, in March, 1907, flowing at the rate of about 3 miles an hour. Such a flow presupposes a very large basin or catchment area, probably including mountains covered with snow in winter. The combined waters of the Hajamal river, the Rudari river, and the Birkeh Sultan valley produced only a quite insignificant flow of water. The total catchment area of these streams is certainly not less than 5000 square miles, hence we may reasonably assume that the area drained by the Shor river is immensely greater, and probably greater than that shown on the map. I may here add parenthetically that the existence of the Naband river, receiving water from Biris and Lar, is more than doubtful, whilst it is quite certain Kuh-Kunchi and Kuh-i-Pul-i-Khamir, south of Birkeh Sultan, are continuous, the tributary of the Maherun separating them being non-existent.

To return to our road, on the north bank of the river, about half a mile from the road, will be seen two bridges, each of about 40 arches, of stone and still almost intact. The river has long ago changed its bed, and left the bridges standing useless on the bank. Like almost all other public works of utility and beauty in Persia, these bridges are the work of Shah Abbas. The Khan of Lar has announced his intention of building a new bridge, which, if ever completed, will be a great boon to caravans using this route.

From Gachin to Kuristan the valley presents few features of interest. To the north it is bounded by the precipitous and impassable slopes of Kuh-i-Gishu, to the south by low barren ridges. No cultivation is to be found, and the valley is practically unpopulated except for a few weeks in the year, when the harvesting of the dates brings out crowds from Bandar Abbas.

* See Goldsmid, 'South-East Persia,' vol. 2, note by Blanford.

At Kuristan the whole surface of the valley is covered with pebbles and small boulders, and furrowed by water, showing that when the Hajamal, coming through the Tang-i-Rasul, and the Rudari river,

VIEW FROM TANG-I-RUDARI, LOOKING NORTH-WEST.

coming through the Tang-i-Rudari, are in flood, the whole valley, here about 3 miles broad, is flooded. The orography of this region is

KISHI. KUH-I-GISHU IN DISTANCE.

typical of that of Persia as a whole: the Rudari, waterless except when in flood, pierces a ridge of rock some 400 feet above plain-level (see illustration)—a ravine so narrow that, when in flood, the river is as

much as 30 feet deep at this point, restricted as it is by precipitous walls of very hard gravel conglomerate. The Tang-i-Rasul is somewhat similar in appearance on the south side of the valley. It should be noted that the above streams are not shown on existing maps as debouching at Kuristan.

On either side of the Kuristan valley, separated from it by steep rocky ridges, are desolate salt wildernesses, through which the above rivers run. For many hundreds of square miles the hard grey marl which underlies the Tertiary gravels in this part of the world has been laid bare.* Being soft, it has been worn by rain into numberless razor-edged hills or hillocks, with steep even sides, and the contrast between the light marl and the dark shadows in the early morning or in the evening is most striking.

This plain occupies, in reality, the wide expanse bounded by Kuh-i-Hormuz, Kuh-i-Zad Mahmud, Kuh-i-Howin, and Kuh-i-Goniz and Kuh-i-Gishu, which form three sides of a trapezium, and enclose an area drained by the Rudari river into the Kuristan valley. A road leads through Tang-i-Rudari to Rudar, Gishu, Howin, and Titang, and thence in all probability to Forg. It is to be hoped that some future traveller may explore this road, which would yield valuable geographical results.

From Kuristan to Birkeh Nuh the road, slowly ascending, traverses a barren narrow valley, uninhabited, and hedged in on either side by high ridges which separate it from even more desolate expanses. The caravanserai of Birkeh Nuh stands alone upon a stony little plateau, drained by three torrents, flowing respectively towards Kishi, Kuristan, and Jihun. Kishi itself is a little village at the foot of the broad-backed slopes of Kuh-i-Kishi; it is some 4 miles distance from Birkeh Nuh, and owes its existence to the fresh-water stream rising on Kuh-i-Hormuz, and flowing past Kishi into the Rudari torrent. It is noteworthy that whenever streams rise and flow on tertiary gravels, they remain fresh, but soon become brackish when they reach the grey marl, which is, I think, undoubtedly saline.

Leaving Birkeh Nuh, the road descends to the Jihun plain, the length of which it traverses. At Jihun a road diverges to Bastak, crossing the stream, here known as the Rasul river, but further up as the Hajamal river which joins the Rudari stream at Kuristan. Duck were here seen in fair numbers, although the stream was excessively salt. At its most westerly extremity stands the serai of Pas Par Dalan, at the entrance to the Tang-i-Dalan, dominated by a watch tower which commands the footpath connecting Dalan village with the serai. A splendid supply of water from a *kanat* and several palm trees combine to delight the traveller, who will have had to content himself for the

* *Vide* H. J. Carter, *Proc. Bombay Asiatic Society*, 4, 1853, pp. 21–96.

past week with treeless camping-grounds and water of a most indifferent quality from the cisterns, so dirty as to defy all efforts to cleanse it with a Berkefeld filter.

The Tang-i-Dalan, which is now entered, is a narrow gorge through which the Hajamal river flows: on either side cliffs rise to a height of about 200 feet very steeply, whilst the river-bed occupies almost the whole of the bottom of the gorge. This formation continues for about 2 miles, until Sartang is reached, a picturesque little *serai*, with a date grove near by, standing at the foot of Kuh-i-Hormuz, which rears its bare head 1500 feet above the plain.

From Sartang to Hormuz the road winds among low hills, which fill the valley and obstruct the view to an unaccustomed extent, until the

PAS PAR DALAN.

little village of Hormuz, with its large date groves, comes into sight, standing on a grassy plain some 5 miles in either direction, and bounded on all sides by high hills.

Stack * reports the existence of extensive ruins near Hormuz; none such were seen on this occasion, nor are they mentioned by Vaughan;† and, in any case, their existence does not go far to prove the existence, in some by-gone period, of a large city. The Persian habit of deserting villages and houses, and of rebuilding houses, when necessary, upon new sites, is too well known to require mention in this connection.

The road now leaves the main caravan route to Yezd *viâ* Forg, and quits the valley *viâ* the Gardan-i-Bazan, a steep and slippery pass over

* E. Stack, 'Six Months in Persia,' 1882, vol. 1, pp. 147 *et seq.*

† *Proceedings* R.G.S., 1890, pp. 580 *et seq.*

slabs of inclined limestone, which cause no small difficulty to horses, though donkeys apparently negotiate it without difficulty. Limestone was here observed for the first time.

Once arrived at the summit, which is only some 400 feet above the Hormuz plain, a magnificent view is commanded of the Aliabad plain, which stretches for some 15 miles westwards, and is refreshingly green after the arid wastes previously encountered. Its sole denizens are a few nomads, with numerous flocks, and the timid inhabitants of the hamlet of Aliabad, who live in constant fear of the Arabs.

The Aliabad valley is in reality some 16 miles wide, but is bisected by the narrow Kuh-i-Fildani ridge, which is pierced in three places by streams flowing east to the Shor river. The southern half of the valley is grassy, and only salt in a few places; the northern half is a wilderness of water-worn hillocks of grey marl, and so encrusted with salt that not a blade of grass, nor, indeed, any vegetation whatever, can be seen. At the west end of the valley, the road adopts the more northerly fork of the valley, and, leaving Aliabad, some $1\frac{1}{2}$ miles to the north of the commodious *serai* of Chahar Birkeh, ascends gently over the usual stony wastes to the so-called Tang-i-Nao, an inconspicuous ridge, which divides the Lar and the Aliabad valley, and incidentally is the dividing-line between the basin of the Shor river and that of the river which drains the Lar plain. Everything points to this plain being drained into the Mand river, or into its tributary, the Kara Agach; the Naband river could nowhere be identified, nor could its existence be corroborated in any way. From Tang-i-Nao to Lar is a dreary march of 16 miles over a flat alluvial plain, bounded on either side by barren mountains. Such irrigation as is practised is effected by means of wells, kanats in actual use being few in numbers. When within 4 miles of Lar the first glimpse of the city is obtained, but it is not until the hills west of and dominating Lar are ascended that the full beauty of the city can be appreciated.

Standing at the foot of the flat ridges, which rise some 400 feet above plain-level and block the valley to the west, the city of Lar presents a not unimpressive spectacle. To the east the fertile plain, dotted with palm groves and clustered hamlets, stretches for some 10 miles; to the south, the road to Lingah winds up the rugged slopes of the mountains which lie between Lar and its principal port Lingah, whilst to the north a scarcely less forbidding range of hills seems to bar the way.

Stack has left on record a good account of the town, but twenty-five years have elapsed since he visited the place, and, alone perhaps amongst all the towns of Southern Persia, Lar has altered for the better during that period. The fine covered bazar, which Stack found in ruins, is now in excellent repair, and the home of busy and prosperous merchants, amongst whom are here, as elsewhere, a few Jews. The splendid cistern

that Stack saw in ruins is now restored, and full of excellent water; the fort, on the other hand, and the town walls are no longer recognizable.

TANG-I-DALAN.

The father of the present Khan is responsible for these and other public works of utility in Lar, and the excellent example thus set has been

SARTANG DATE GROVE. KUH-I-HORMUZ IN DISTANCE.

followed by his son, in spite of the treatment which he received at the hands of the Persian Government when he took his father's place as Khan. If we are to believe local tradition, the Government then

demanded 100,000 Tomans on the ground that a ruler who had built so extensively must assuredly have left great wealth behind him.

The present Khan is a fine specimen of a class that is, unhappily, extremely rare in Persia. His office is, in practice, hereditary; he enjoys the confidence of his subjects, and the respect, to put it mildly, of his superiors; in these respects he resembles his father.

Stack's description of the present Khan's father is so apposite as to deserve quotation: "A tall, powerfully built man, dignified and orthodox, seemly in person, decorous in apparel, stately in speech, courteous in demeanour; his dress half Arab."

Section II.

Lar to Shiraz.

The road to Shiraz from Lar *viâ* Jahrum leads over some steep ridges, past a serai known as Pusht-i-Sangar. Long lines of heaped-up stones in the vicinity suggest the derivation of the name; in all probability these defences are a relic of the Baluch raids stated by Sykes * to have taken place in 1810. Native tradition confirms this view. Once over the steep ridges that shut in the Lar valley to the north, and which are pierced only by the Gardan-i-Narangi, the road descends steeply to the Kurdah plain, and is here so blocked by overhanging rocks as to present serious difficulties to camels with bulky loads. Whatever water is not absorbed by the thirsty soil of the Kurdah plain runs in a small watercourse down the centre of the plain in a westerly direction. After a dreary march of some 8 miles across this plain, a sharp corner is turned, a small ravine followed, till the track emerges on to the little Dahkuh plain, an expanse of perfectly flat arable land some 2 miles square, hemmed in by low hills, and drained by the ravine referred to above into the Kurdah plain.

From Dahkuh a track diverges direct to Forg, the main road to Jahrum running north-west over very stony ground for some 12 miles to Biris. Midway between Dahkuh and Biris the track crosses the watershed dividing the Kurdah and Biris systems. Existing maps are incorrect on this point.

The fine serai and little hamlet of Biris, with blue domed mosque close by, stands at the edge of a narrow flat plain, some 10 miles long east and west, and 2 miles broad. To the east, Kuh-i-Safid stands up prominently, the reddish-brown shales, relieved by white streaks of salt in the ravines, contrasting strongly with the uniform grey of the surrounding gravels. The plain is drained by a torrent which has forced its way northwards through successive ranges of hard

* Major P. M. Sykes, 'Ten Thousand Miles in Persia,' p. 105.

conglomerate, from 50 to 400 feet in height, and then, turning west, flows down a narrow ravine until it debouches on to the Banaru plain.

Surmounting the low ridge which bounds the Biris plain to the west, the road descends through ravines and gullies to a fertile little valley, remarkable for the rocky ridges which project from the flat plain; the appearance of such isolated ridges, from 20 to 200 feet in height, is uncommon in the plains, and the writer can recall no place in Persia where they are so prominent as in this valley.

Banaru is a picturesque little town, built on the precipitous slopes of Kuh-i-Banaru, which rears its gaunt frame to a height of nearly 1000 feet above plain-level. Its summit, known locally as Takht-i-Banaru, or the Throne of Banaru, commands a magnificent view of

PANORAMA OF LAR.

the surrounding country. It is crowned by the ruins of a building, apparently of great age; a covered way, of which the remains are visible, led thence down the eastern edge to the walled town below. Ruins of about a hundred houses, built on the steep and rocky hill slopes, with a large cistern, and a well sunk through the solid rock to a depth of 200 feet, the whole surrounded by a double wall of great thickness, indicate that the town was formerly, as local tradition asserts, the seat of a semi-independent government. At the foot of the hill high continuous mounds of earth mark the site of an old fort, probably contemporaneous with the town.

From Banaru an uninterrupted view is obtained across the plain which stretches 12 miles northwards to Juwun, a village some 3 miles from the south slope of Kuh-i-Alburd, and the centre of a scattered line of villages which extends east and west along the edge of the plain.

Juwun is the headquarters of a portion of the Lar district, and was, in March, 1907, in charge of Ḥusain Ali Khán, son of Sheikh-ul-Nizam Khán and nephew of Ali Ḳuli Khan, the present ruler of Lar. In many respects he resembles his uncle; tall, handsome, and powerfully built, he appeared to be both intelligent and energetic, and deservedly popular with those whom he ruled. It need scarcely be added that, like his uncle, he evinced that courtesy and hospitality for which Persians are famous.

From Juwun to Jahrum the traveller must choose one of two possible routes. The most commonly used track, *viâ* Chahtalkh, is stony, hilly, and liable, according to native report, to raids. The alternative route *viâ* Chahtiz is of equal length, attains a higher elevation (5000 feet), has no intermediate serai, and for the first few miles presents difficulties more formidable than will be met with anywhere else between Bandar Abbas and Resht. It is the latter route that is described below.

After a gentle ascent of 3 miles from Juwun towards the foot of the hills, the road enters the Tang-i-Kulún. It here passes along the bed of a ravine, which transects the lower slopes of Kuh-i-Alburd in the same way that the Kara Agach transects Kuh-i-Safidar. The bed of the ravine, seldom more than 15 feet, sometimes only 5 feet wide, hedged in by impassable cliffs and blocked by large boulders, presents real difficulties to donkeys and mules, and cannot be negotiated by camels; during heavy rain the gorge is impassable. After traversing this gorge for about 3 miles, the path emerges by a steep ascent on to the Yezd-i-Khast plain, and, turning west-north-west, continues up the Chahtiz valley. This valley, hitherto untrodden by Europeans, and not marked on existing maps, is perhaps the most strikingly picturesque of all the valleys of South Persia.

It is uninhabited except by nomads, and, for a few months in the year, by a few families from Juwun or Jahrum. It receives the greater part of the drainage of the lofty Kuh-i-Alburd, and partly on this account, partly by reason of the elevation, is plentifully wooded with tall bushes and stunted trees, which lend a very un-Persian appearance to the valley. To the west, the valley is bounded by a precipitous isolated ridge about 1000 feet high, whose slopes on either side are of not less than 50°; this range is pierced in three places by gorges which carry off the water from the slopes of Kuh-i-Alburd into this valley, whence it drains towards Juyun or Jahrum as the case may be. The summit of the pass (5400 feet), known as Chahtiz,* or Chahbid,† is a grassy plateau, sparsely wooded, sheltered on east and west by high ridges half a mile distant, and furnished with a small spring.

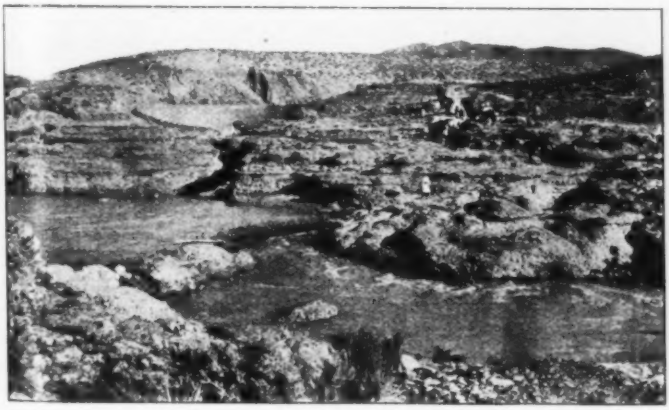
* = steep well.

† = desert well or willow well. There is reason to believe that the latter derivation, though the popular one, is incorrect.

From this point to Jahrum the valley presents very similar features to those indicated above, the isolated ridge continuing to within 8 miles

ENTRANCE INTO TANG-I-TADUN. AZIMUNGIRD IN DISTANCE.

of Jahrum, where it is merged into the Kuh-i-Bafra, as the north end of Kuh-i-Alburd is called. Jahrum has been not infrequently



FOOTBRIDGE OVER KARA AGACH, NEAR ISMAILABAD.

visited in past years, and it is not necessary to add anything to the accounts that have already been published. Suffice it to say that it is a flourishing town of some 9000 inhabitants, who live by agriculture, and on the proceeds of the famous date palms for which Jahrum is

famous throughout Persia, rivalling even Basra in this respect. It stands on a broad plain, well irrigated and cultivated, but broken in places by rocky ridges. Turning east and fording a salt river, called "Shur"* by the natives of the plain, for want of a more definite appellation, the track passes over a masonry bridge in good repair, which spans a permanently dry watercourse, probably the old bed of the river previously crossed. Three roads diverge at this point—one to Fasa, another to Shiraz *viâ* Khana Kahdan, and a third to Shiraz *viâ* Azimunjird.

Following the last named, irrigated fields are traversed for another 4 miles, when the hills are again reached. The road now enters a new phase, running amongst low ridges and hillocks to Mukhak, a large serai standing alone 17 miles from Jahrum.† North of Mukhak, midway between this place and Azimunjird, the track crosses the watershed separating the Jahrum and Kara Agach valley systems, and descends gently to the south end of Kuh-i-Safidar. Numerous villages here come into sight, most of them owing their existence to the generous supply of water afforded by the Kara Agach. Arrived at this point, the traveller will search perplexedly for the above river, of whose existence he will be doubtless aware, and which might be expected to flow *round* the hill. A walk of 3 miles up a gentle slope brings us opposite to the Tang-i-Tadun, a narrow gorge through which the Kara Agach, in defiance of present-day levels and necessities, forces its way *through* Kuh-i-Safidar, which is at this point about 500 feet above plain-level. On the slopes south of the east entrance to the gorge may be seen the ruins of an old fort, locally ascribed, like all old buildings in this part of Persia, to Zoroastrians. The remains of a stone bridge may also be observed in the middle of the gorge. When visited in March, 1907, the river was about 3 feet deep, but flowing so rapidly that it was impossible to keep one's footing, and no animal could possibly cross. Azimunjird itself is a pretty little village surrounded by orchards and irrigated fields. Similar villages occur at very frequent intervals on either side of the river from this point to Mazafri, and it would be difficult to find a more fertile little valley in all Persia. Villages on the west bank benefit, in addition, from hill springs and streams rising in Kuh-i-Safidar, which, owing to its position and height, receives far more snow and rain than the surrounding hills. Torrents of rain were several times observed on Kuh-i-

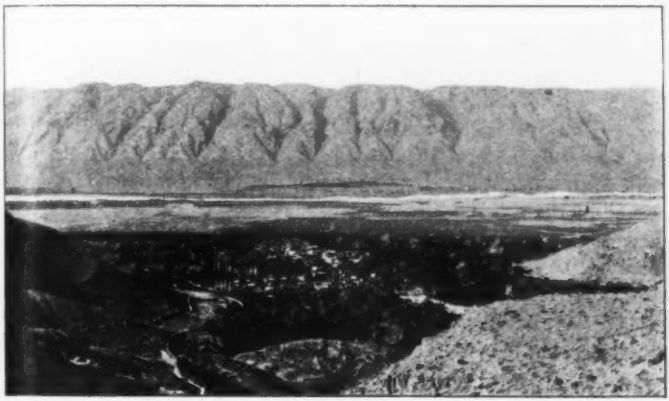
* = salt.

† On the walls of the now deserted Shah Abbas *serai* at Mukhak, cut into the cement, and with every appearance of great age, the following strange inscription can be seen:—

. . . FFICILIA UTILIA
. . . MERS
1678

Safidar, at a time when no rain was falling anywhere else. This fact doubtless accounts for the thicker population on the west bank. Midway between Azimunjird and Abbasabad the village of Babanar is passed, nestling in a valley $1\frac{1}{2}$ mile from the east bank of the river, and facing Kuh-i-Safidar. This is the limit of the date palm, which does not bear good fruit north of this village, although it is occasionally to be found in Shiraz.

A few miles south of Abbasabad the Kara Agach runs through another gorge, the sides of which disclose the distorted strata remarkably clearly. From Abbasabad the main road to Shiraz runs through Mazafri, or Akbarabad, across a flat plain, broken in places by low



BABANAR.

hills, extensively irrigated, but presenting nothing of special interest. A few miles north of Akbarabad, at Baba Haji, the Firuzabad road joins the main Jahrum-Shiraz road. A more attractive though circuitous route to Shiraz diverges from Mazafri over the hills to the east into the Sarvistan plain, touching the pretty little village of Kunjun at the foot of the hills close to the Sarvistan-Maharlu road. This little village, like others on the fertile Sarvistan plain, is a veritable agricultural paradise. Grain grown in the district is noted for its flavour, and fetches a high price in the market, whilst water flows freely from inexhaustible streams, rendering the village independent of rainfall.

From Kunjun Shiraz may be reached by skirting either side of the Shiraz lake. If the traveller chooses the westerly track, past Maharlu village and over the Pul-i-Fasa, he will be taking the shortest road by a mile or two. The easterly track is described below. After about

6 miles across the open plain the south-east extremity of the lake is reached. The road from this point onwards follows closely the rugged shore, deeply indented wherever valleys debouch into the lake. Only once or twice does the road desert the shore in order to surmount a spit of land running far into the lake, and the traveller will gladly undertake the brief ascent in order to be rid for a time of the gnats which infest the reeking marshes that surely indicate an inflow of fresh water into the lake, which is itself extremely saline. Nothing is more surprising than the frequency with which fresh water springs, often of considerable size, are met with on the edges of the lake. Turtles and fresh-water fish abound in the lagoons formed by them, and ducks, waders, and many other kinds of bird breed in the dense marshes, for the existence of which fresh water is a necessity. There is no reason to think that similar fresh-water springs do not occur below the level of the lake, and in any estimate of the inflow into the lake it would be safe to assume that the volume from subterranean sources is considerably greater than that from the surface streams, attenuated as they are by the demands of irrigation.

This lake presents some curious features to the geologist. The great Arab geographer Ibn Batuta makes no mention of it in his account of Shiraz, and Curzon considers this to be fairly satisfactory evidence of its recent formation. But if the lake be but eight hundred years old, how does it come to be so salt? The water flowing in is fresh, or practically so, and to bring the lake to its present state of saltness a far greater period would no doubt be necessary. If, on the other hand, the lake is of great antiquity, contemporaneous with the surrounding hills, how is it that no depositions of rock-salt have been formed, and that the Sarvistan plain, which is only a few feet above the present water-level, is almost free from salt. The simplest explanation would seem to be that until comparatively recent times the lake, being deeper, had an outlet, but that as the rainfall diminished, the water-level sank below the level of the outlet, and an equilibrium was formed between evaporation and inflow. The general tendency of the lake is to diminish in volume, though very gradually. There is no evidence to support the theory of a subterranean channel whereby water escapes; did such a channel exist, the lake would probably not be saline. The northern extremity of the lake is occupied by broad marshes, the haunt of innumerable water-fowl and waders, and a paradise for the naturalist or sportsman. From lake to marsh, from marsh to reclaimed meadow, from meadow to irrigated field, the change is almost imperceptible until within sight of Shiraz, when the country once more assumes the normal aspect of a Persian valley.

The town of Shiraz has been so well depicted by Curzon, Sykes, and others, that to attempt any description of it would be at once presumptuous and unnecessary. Only in recent years, however, has

the tomb of Hafiz, the famous poet, been desecrated by the erection over it of a meretricious abomination, which, with its gaudily painted tin banners, badly designed scrollwork, and corrugated iron roof, is a

GORGE OF KARA AGACH, NEAR ISMAILABAD.

DANJA-I-MAHARLU, OR SHIRAZ LAKE.

monument of the bad taste of an Oriental, once he permits himself to depart from the national canons of art and architecture. One cannot help hoping that the Persian of a later age may some day awake to a sense of responsibility for the preservation of those glorious relics of

the past which, whatever be Persia's destiny, must still remain her most precious heritage.

I will terminate these notes by a few general observations upon certain aspects of our journey.

Major Sykes's statement * that the mountainous ridge between the Persian gulf and the interior of Persia offers formidable difficulties to engineering enterprise, can only be considered to apply to the region north of Bushire. Between Bandar Abbas and Shiraz the road, as will be gathered from previous pages, should the reader have had the patience to peruse them, traverses valley after valley, crossing from one to the other by means of low saddles, which would offer very little difficulty to an engineer. A good carriage-road, on the same scale as that between Tehran and Rasht, could be constructed very cheaply—far cheaper, at all events, than the above-mentioned road, between Bandar Abbas and Shiraz; whether it would pay as a commercial speculation is a point for experts on the spot to determine. The opinion of the writer is that it would *not* pay, though a railway very possibly would do so. From Jahrum to Shiraz the existing road is so easy that carts could be taken over it at a fair pace at once, a few hours' work here and there being all that is required to put the road on a par, at least, with the Ispahan-Shiraz cart-road.

As remarked by Curzon, the most marked feature of Persian orography is the way in which the mountain ranges, whose general direction is south-south-east to north-north-west, are pierced, often near their highest point, by streams, sometimes large, but more often of insignificant size. His suggestion that these gorges are, in reality, fissures produced at the moment of upheaval, is supported by Loftus,† though Curzon himself quotes no authority. Examples of this phenomenon were frequently met with, notably the Tang-i-Kulún, near Juyun, and the Tang-i-Tadun.

It is perhaps worthy of remark that the principal watersheds of Persia are not the principal mountain ranges; the north and a large part of the south slopes of the Elburz drain into the Caspian sea; the dividing-line between rivers draining into the sea and those draining inland, where crossed near Shiraz, is for the most part only a low range of hills; the watershed between the Shor river and the Kara Agach river basins could only be traced with difficulty.

Irrigation.—There are no traces of irrigation works on a large scale having ever existed in the country between Jahrum and Shiraz, where alone sufficient water is found to make such enterprises profitable. There is little doubt that the Kara Agach, if dammed here and there and diverted into small canals, would water a far larger area than it

* 'Ten Thousand Miles in Persia,' p. 449.

† W. K. Loftus, *Quart. Journ. Geol. Soc.*, vol. 7, p. 263.

does at present; there is a large area of desert which only requires water to produce perennial crops of wheat, barley, and other grains. The Kara Agach, in the spring, flows at an average rate of about 7 miles an hour; its banks, moreover, are not very high; irrigation works, therefore, even at present, are easily carried out.

Population.—From Bandar Abbas to Lar the country traversed by the road described above, and, indeed, on either side of the road for 30 miles, is practically uninhabited, the total population in this area being probably less than 3000. The numerous names on the map indicate, not villages, but desolate caravanserais. Travellers, therefore, have to rely largely on their own stocks for food for themselves, their servants, and animals.

Political Aspect of South Persia.—Probably no part of Persia is less subjected to the direct tyranny of the central government, at Teheran or Shiraz, than the coast districts of this part of Persia, Bandar Abbas always excepted. The "khans" are usually appointed for life from the same family; the government is more patriarchal than elsewhere, and active in other directions than tax-collecting only. The Khan of Lar was distinctly popular with his subjects, and deservedly so. Gun-running from Maskat, and the subsequent disposal of the rifles and ammunition thus obtained, is a welcome addition to the coffers of the chiefs who control the littoral, and this subject rivals highway robbery as the principal topic of conversation.

The position of South Persia, as might be expected, accounts for the really friendly sentiments of the people towards India and all things Indian; their political horizon is, however, surprisingly narrow. The Amir of Afghanistan was but a name to them, and his doings of no interest whatever. England, or rather London, was well known to every one as the place whence everything really good in the way of guns and high-class merchandise originated. England's connection with India was, however, not understood as a rule, and never fully appreciated.

In conclusion, I should add that, whilst responsible for the compilation of these notes, I have to thank Mr. A. H. P. Cruickshank, 32nd Sikh Pioneers, in conjunction and collaboration with whom the journey was undertaken, for the photographs, and, to no small extent, for the materials from which these notes were compiled.

COAST PEOPLES.*

By ELLEN CHURCHILL SEMPLE.

Part II.

Among coast-dwelling peoples we find every degree of intimacy with the water, from the amphibian life of many Malay tribes who love the wash of the waves beneath their pile-built villages, to the Nama bushmen who inhabit the dune-walled coast of South-West Africa, and know nothing of the sea. In the resulting nautical development the natural talents and habits of the people are of immense influence; but these in turn have been in part determined by the geographical environment of their previous habitat, whether inland or coastal, and by the duration in time, as well as the degree and necessity, of their contact with the sea. The Phœnicians, who, according to their traditions as variously interpreted, came to the coast of Lebanon either from the Persian gulf or the Red sea,† brought to their favourable maritime location a different endowment from that of the land-trading Philistines who moved up from the south to occupy the sand-choked shores of Palestine,‡ or from that of the Jews, bred to the grasslands of Mesopotamia and the grainfields of Egypt, who only at rare periods in their history forced their way to the sea.§ The unindented coast stretching from Cape Carmel south to the Nile delta never produced a maritime people and never achieved maritime importance, till a race of experienced mariners like the Greeks planted their colonies and built their harbour moles on the shores of Sharon and Philistia.‖ So on the west face of Africa, from the Senegal southward along the whole Guinea Coast to Benguela, all evidences of kinship and tradition among the local tribes point to an origin on the interior plains and a recent migration seaward,¶ so that no previous schooling enabled them to exploit the numerous good harbours along this littoral, as did the sea-bred Portuguese and English.

Not only the accessibility of the coast from the sea, but also its habitability enters as a factor into its historical importance. A sandy desert coast, like that of South-West Africa and much of the Peruvian littoral, or a sterile mountain face, like that of Lower California, excludes the people of the country from the sea. Saldanha bay, the

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* Continued from p. 90.

† Strabo, book xvi. ch. iii. 4, 27; Herodotus, book i. ch. i., book vii. ch. 89.

‡ George Adam Smith, 'Historical Geography of the Holy Land,' pp. 169–170. New York: 1897.

§ Ibid., pp. 179, 185, 286.

‖ Ibid., pp. 127–131.

¶ F. Ratzel, 'History of Mankind,' vol. 3, pp. 100–102; and *passim*, 132–145. London: 1898.

one good natural harbour on the west coast of Cape Colony, is worthless even to the enterprising English, because it has no supply of fresh water.* The failure of the ancient Egyptians to take the short step forward from river to marine navigation can undoubtedly be traced to the fact that the sour swamps, barren sand-dunes, and pestilential marshes on the seaward side of the Nile delta must have always been sparsely populated as they are to-day,† and that a broad stretch of sandy waste backed their Red sea littoral.

On the other hand, where the hem of the continents is fertile enough to support a dense population, a large number of people are brought into contact with the sea, even where no elaborate articulation lengthens the shoreline. When this teeming humanity of a garden littoral is barred from landward expansion by desert or mountain, or by the already overcrowded population of its own hinterland, it wells over the brim of its home country, no matter how large, and overflows to other lands across the seas. The congested population of the fertile and indented coast of southern China, though not strictly speaking a sea-faring people, found an outlet for their redundant humanity and their commerce in the tropical Sunda islands. By the sixth century their trading junks were doing an active business in the harbours of Java, Sumatra, and Malacca; they had even reached Ceylon and the Persian gulf, and a little later were visiting the great focal market of Aden at the entrance of the Red sea.‡ A strong infusion of Chinese blood improved the Malay stock in the Sunda islands, and later in North Borneo and certain of the Philippines, whither their traders and emigrants turned in the fourteenth century, when they found their opportunities curtailed in the archipelago to the south by the spread of Islam.§ Now the "yellow peril" threatens the whole circle of these islands from Luzon to Sumatra.

Similarly India, first from its eastern, later from its western coast, sent a stream of traders, Bhuddist priests, and colonists to the Sunda islands, and especially to Java, as early as the fifth century of our era, whence Indian civilization, religion, and elements of the Sanskrit tongue spread to Borneo, Sumatra, Bali, Lombok, and even to some smaller islands among the Molucca group.‖ The Hindus became the dominant commercial nation of the Indian ocean long before the great development of Arabian sea power, and later shared the trade of the East African coast with the merchants of Oman and Yemen.¶ To-day they

* H. R. Mill, 'International Geography,' p. 985. New York: 1902.
† D. G. Hogarth, 'The Nearer East,' pp. 84, 166. London: 1902.
‡ Hans Helmolt, 'History of the World,' vol. 2, p. 544, 593. New York: 1904.
§ F. Ratzel, 'History of Mankind,' vol. 1, p. 397. London: 1896. 'Philippine Census,' vol. 1, pp. 438, 481–491. Washington: 1905.
‖ H. Helmolt, 'History of the World,' vol. 2, p. 547. New York: 1904.
¶ Ibid., vol. 3, pp. 431, 434.

form a considerable mercantile class in the ports of Maskat, Aden, Zanzibar, Pemba, and Natal.

On the coasts of large fertile areas like China and India, however, maritime activity comes not as an early, but as an eventual development, assumes not a dominant, but an incidental historical importance. The coastlands appearing early on the maritime stage of history, and playing a brilliant part in the drama of the sea, have been habitable, but their tillable fields have been limited either in fertility, as in New England, or in amount, as in Greece, or in both respects, as in Norway. But if blessed with advantageous location for international trade and many or even a few fairly good harbours, such coasts tend to develop wide maritime dominion and colonial expansion.

Great fertility in a narrow coastal belt barred from the interior serves to concentrate and energize the maritime activities of the nation. The 20-mile wide plain stretching along the foot of the Lebanon range from Antioch to Cape Carmel is even now the garden of Syria.* In ancient Phœnician days its abundant crops and vines supported luxuriant cities and a teeming population, which sailed and traded and colonized to the Atlantic outskirts of Europe and Africa. Moreover, their maritime ventures had a wide sweep as early as 1100 B.C. Quite similar to the Phœnician littoral and almost duplicating its history, is the Oman seaboard of eastern Arabia. Here again a fertile coastal plain sprinkled with its "hundred villages," edged with a few tolerable harbours, and backed by a high mountain wall with an expanse of desert beyond, produced a race of bold and skilful navigators,† who in the Middle Ages used their location between the Persian gulf and the Arabian sea to make themselves the dominant maritime power of the Indian ocean. With them maritime expansion was typically wide in its sweep and rapid in its development. Even before Mohammed's time they had reached India; but under the energizing influences of Islam, by 850 they had established a flourishing trade with China, for which they set up way-stations or staple-points in the Sunda islands.‡ First as voyagers and merchants, then as colonists, they came, bringing their wares and their religion to these distant shores. Marco Polo, visiting Sumatra in 1260, tells us the coast population was "Saracen," but this was probably more in religion than in blood. Oman ventures reached as far south as east. The trading stations of Makdishu and Barawa were established on the Somali coast of East Africa in 908, and Kilwa 750 miles further south in 925. In the seventeenth century the Oman Arabs dislodged the intruding Portuguese from all this coast belt down to the present northern boundary of Portuguese East Africa.

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* D. G. Hogarth, 'The Nearer East,' pp. 111–112, 152. London: 1902.
† Ibid., pp. 73–74, 139, 267.
‡ H. Helmolt, 'History of the World,' vol. 2, p. 548. New York: 1904.

Even so late as 1850 their capital, Maskat, sent out fine merchantmen that did an expensive carrying trade, and might be seen loading in the ports of British India, in Singapore, Java, and Mauritius.

Brittany's active part in the maritime history of France is due, not only to its ragged contour, its inshore and offshore islands, its forward location on the Atlantic which brought it near to the fisheries of Newfoundland and the trade of the West Indies, but also to the fact that the "Golden Belt," which, with but few interruptions, forms a band of fertility along the coast, has supported a denser population than the sterile granitic soils of the interior,* while the sea near by varied and enriched the diet of the inhabitants by its abundance of fish, and in its limy seaweed yielded a valuable fertilizer for their gardens.† The small but countless alluvial deposits at the fiord heads in Norway, aided by the products of the sea, are able to support a considerable number of people. Hence the narrow coastal rim of that country shows always a density of population double or quadruple that of the next density belt towards the mountainous interior, and contains seventeen out of Norway's nineteen towns having more than 5000 inhabitants.‡ It is this relative fertility of the coastal regions, as opposed to the sterile interior, that has brought so large a part of Norway's people in contact with the Atlantic and given them a prominent place in maritime history.

Occasionally an infertile and sparsely inhabited littoral bordering a limited zone of singular productivity, especially if favourably located for international trade, will develop marked maritime activity, both in trade and commercial colonization. Such was Arabian Yemen, the home of the ancient Sabæans on the Red sea, stretching from the Straits of Bab-el-Mandeb north-westward for 500 miles. Here a mountain range, rising to 10,000 feet and bordering the plateau desert of central Arabia, condenses the vapours of the summer monsoon and creates a long-drawn oasis, where terraced coffee gardens and orchards blossom in the hot, moist air; but the arid coastal strip at its feet, harbouring a sparse population only along its trickling streams, has developed a series of considerable ports as outlets for the abundant products and crowded population of the highlands.§ A location on the busy sea lane leading from the Indian ocean to the Mediterranean, near the meeting-place of three continents, made the merchants of the Yemen coast, like the

* E. Lavisse, 'Historie de France,' vol. 1, by P. Vidal de la Blache, 'Geographie de la France,' pp. 335–337. Paris: 1903.

† Elisée Reclus, 'The Earth and its Inhabitants: Europe,' vol. 2, p. 252. New York: 1882.

‡ Norway, Official Publication for the Paris Exhibition, pp. 89–91, map of population, p. 4. Christiania: 1900.

§ D. G. Hogarth, 'The Nearer East,' pp. 114, 140, 163, 164, 202, 267. London: 1902.

Oman Arabs to the north, middlemen in the trade of Europe with eastern Africa and India.* Therefore, even in the second century these Sabæans had their trading stations scattered along the east coast of Africa as far south as Mozambique.† In 1502 Vasco da Gama found Arabs, either of Oman or Yemen, yet farther south in Sofala, the port for the ivory and gold trade. Some of them he employed as pilots to steer his course to India.‡

History makes one fact very plain: a people who dwell by the sea, and to whom nature applies some lash to drive them out upon the deep, command opportunity for practically unlimited expansion. In this way small and apparently ill-favoured strips of the Earth's surface have become the seats of wide maritime supremacy and colonial empire. The scattered but extensive seaboard possessions of little Venice and Genoa in the latter centuries of the Middle Ages are paralleled in modern times by the large oversea dominions of the English and Dutch.

Seaward expansions of peoples are always of great moment and generally of vast extent, whether they are the coastward movements of inland peoples to get a foothold upon the great oceanic highway of trade and civilization, as has been the case with the Russians notably since the early eighteenth century, and with numerous interior tribes of West Africa since the opening of the slave trade; or whether they represent the more rapid and extensive coastwise and oversea expansions of a maritime nation like the English, Dutch, and Portuguese. In either event they give rise to widespread displacements of peoples and a bizarre arrangement of race elements along the coast. When these two contrary movements meet, the shock of battle follows, as the recent history of the Russians and Japanese in Manchuria and Korea illustrates, the wars of Swedes and Russians for the possession of the eastern Baltic littoral, and the numerous minor conflicts that have occurred in Upper Guinea between European commercial powers and the would-be trading tribes of the bordering hinterland.

A coast region is always a peculiar habitat, inasmuch as it is more or less dominated by the sea. It is exposed to inundation by tidal wave and to occupation by immigrant fleets. It may be the base for outgoing maritime enterprise or the objective of some oversea movement, the dispenser or the recipient of colonists. The contrast between the inhabitants of the coast and the near-by inland people, which exists so widely, is to be traced, not so often to a difference of environment as to the more fundamental difference of race or tribe caused by immigration to accessible shores. The Greeks, crowded in their narrow peninsula of

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* Strabo, book xvi. ch. iv. 2, 19.

† H. Helmolt, 'History of the World,' vol. 3, p. 433. New York: 1903.

‡ James Bryce, 'Impressions of South Africa,' pp. 79–82, 99. New York: 1897.

limited fertility, wove an Hellenic border on the skirts of the Black sea and eastern Mediterranean lands, just as the Carthaginians added a fringe of aliens to North Africa, where the Punic people of the coast presented a marked contrast to the Berbers of the interior. Detached from its hinterland, it developed an almost purely maritime history,* except when some tide of conquest or migration from the nomad-breeding plateau overwhelmed the littoral.

An ethnographical map of Russia to-day shows a narrow but almost continuous rim of Germans stretching from the river Niemen north through the Baltic coast of Courland, Livland, and Esthland, as far as Revel; and again, a similar band of Swedes along the seaboard of Finland, from a point east of Helsingfors on the south around to Uleaborg on the north,† dating from the time when Finland was a political dependency of Sweden, and influenced by the fact that the frozen Gulf of Bothnia every winter makes a bridge of ice between the two shores.

Everywhere in the Melanesian archipelago, where Papuans and Malays dwell side by side, the latter as the new-comers are always found in possession of the coast, while the darker aborigines have withdrawn into the interior. So in the Philippines, the aboriginal Negritos, pure or more often mixed with Malayan blood, as in the Mangyan tribe of central Mindoro, are found crowded back into the interior by the successive invasions of Malays who have encircled the coasts. The Zamboanga peninsula of Mindanao has an inland pagan population of the primitive Malayan race called Subanon, who have been displaced from the littoral by the seafaring Samal Moros, Mohammedanized Malays from the east shores of Sumatra and the adjacent islands, who spread northward about 1300 under the energizing impulse of their new religion.‡ Even at so late a date as the arrival of Magellan, the Subanon seem to have still occupied some points of the coast,§ just as the savage Ainos of the island of Yezo touched the sea about Sapporo only forty years ago, though they are now surrounded by a seaboard rim of Japanese.‖

If we turn to South America, we find that warlike Tupi, at the time of the discovery, occupied the whole Brazilian coast from the southern tropic north to eastern Guiana, where the Tupi element is still strong, while the highlands of eastern Brazil immediately in their rear were populated by tribes of Ges, who had been displaced by the coastwise

* Ernst Curtius, 'History of Greece,' vol. 1, pp. 12–13. New York.

† Anatole Leroy Beaulieu, 'The Empire of the Tsars,' vol. 1. Map facing p. 80. New York.

‡ Philippine Census, vol. 1, pp. 412, 413, 461, 464, 562. Washington: 1905.

§ Ibid., vol. 1, p. 416.

‖ F. Ratzel, 'History of Mankind,' vol. 3, p. 449. London: 1898.

expansion of the Tupi canoemen.* And to-day this same belt of coast-land has been appropriated by a foreign population of Europeans and Negroes, whilst the vast interior of Brazil shows a predominance of native Indian stocks, only broken here and there by a lonely *enclave* of Portuguese settlement. The early English and French territories in America presented this same contrast of coast and inland people—the colonists planting themselves on the hem of the continent to preserve maritime connection with the home countries, the aborigines forced back beyond reach of the tide.

Wherever an energetic seafaring people with marked commercial or colonizing bent makes a highway of the deep, they give rise to this distinction of coast and inland people on whatever shores they touch. The Phœnicians and Greeks did it in the Mediterranean; the expanding Angles and Saxons in the North sea and the Channel, where they stretched their *litus Saxonicum* along the coast of the continent to the apex of Brittany, and along the hem of England from Southampton Water to the Firth of Forth;† the sea-bred Scandinavians farther north in the Teutonic fringe of settlements which they placed on the shores of Celtic Scotland and Ireland.‡

As a rule it is the new-comers who hold the coast, but occasionally the coast-dwellers represent the older ethnic stock. In the Balkan peninsula to-day the descendants of the ancient Hellenes are, with few exceptions, confined to the coast. The reason is to be found in the fact that the Slavs and other northern races who have intruded by successive invasions from the plains of southern Russia are primarily an inland people, and therefore have occupied the core of the peninsula, forcing the original Greek population before them to the edge of the sea.§ This is the same anthropogeographical process which makes so many peninsulas the last halting-place of a dislodged earlier race. But the Greeks who line the northern and western shores of Asiatic Turkey are such only in language and religion, because their prevailing broad head-form shows them to be Turks and Armenians in race stock.‖

Sometimes the distinction of race between coast and interior is obliterated so far as language and civilization are concerned, but survives less conspicuously in head-form and pigmentation. The outermost fringe of the Norwegian coast, from the extreme south to the

* H. Helmolt, 'History of the World,' vol. 1, p. 185. Ethnographical map. New York: 1902. Paul Ehrenreich, "Die Eintheilung und Verbreitung der Völkerstämme Brasiliens," *Petermanns Mittheilungen*, vol. 37, pp. 88, 89. Gotha: 1891.

† J. R. Green, 'The Making of England,' vol. 1, ch. i. "The Conquest of the Saxon Shore." London: 1904.

‡ H. J. Mackinder, 'Britain and the British Seas,' p. 189. London: 1904. W. Z. Ripley, 'The Races of Europe,' pp. 313–315, map. New York: 1899.

§ D. G. Hogarth, 'The Nearer East,' p. 152. London: 1902. W. Z. Ripley, 'The Races of Europe,' pp. 402, 404, map. New York: 1899.

‖ Ibid., pp. 117, 404, 405, 409, 410.

latitude of Trondhjem in the north, is occupied by a broad-headed, round-faced, rather dark people of only medium height, who show decided affinities with the Alpine race of Central Europe, and who present a marked contrast to the tall narrow-headed blondes of pure Teutonic type, constituting the prevailing population from the inner edge of the coast eastward into Sweden. This brachycephalic, un-Germanic stock of the western Norwegian coast seems to represent the last stand made by that once wide-spread Alpine race which here has been shoved along to the rocky capes and islands of the outer edge by a later immigration of German stock coming from Sweden.* So the largest continuous area of Negrito stock in the Philippines is found in the Sierra Madre mountains defining the eastern coast of northern Luzon.† Facing the neighbourless wastes of the Pacific, whence no new settler could come, turned away from the sources of Malay immigration to the south-west, it was given a location to make it a retreat, rather than a gateway to incoming races.

Where an immigrant population from oversea lands occupies the coastal hem of a country, rarely do they preserve the purity of their race. Coming at first with marauding or trading intent, they bring no women with them, but institute their trading stations or colonies by marriage with the women of the country. The ethnic character of the resultant population depends upon the proportion of the two constituent elements, the nearness or remoteness of their previous kinship, and the degree of innate race antagonism. The various Greek elements which crossed the Ægean from different sections of the peninsula to colonize the Ionic coast of Asia Minor mingled with the native Carian, Cretan, Lydian, Pelasgian, and Phœnician populations which they found there.‡ On all the barbarian shores where the Greeks established themselves, there arose a mixed race—in Celtic Massilia, in Libyan Barca, and in Scythian Crimea—but always a race Hellenized, born interpreters and mercantile agents.§ A maritime people, engrossed chiefly with the idea of trade, moves in small groups and intermittently; hence it modifies the original coastal population less than does a genuine colonizing nation, especially as it prefers the smallest possible territorial base for its operations. The Arab element in the coast population of East Africa is strongly represented, but not so strongly as one might expect after a thousand years of intercourse, because it was scattered in detached seaboard points, only few of which were really stable. The native population of Zanzibar and Pemba and the fringe of coast tribes on the mainland opposite are clearly tinged with Arab blood. These Swahili, as they

* W. Z. Ripley, 'The Races of Europe,' pp. 206–208, 210–212. Norway, Official Publication for the Paris Exhibition, pp. 80–81. Christiania: 1900.

† Philippine Census, vol. 2, p. 52, map, p. 50. Washington: 1905.

‡ Grote, 'History of Greece,' vol. 3, pp. 175, 176, 186–189. New York: 1857.

§ Ernst Curtius, 'History of Greece,' vol. 1, book ii. pp. 492–493. New York.

are called, are a highly mixed race, as their negro element has been derived not only from the local coast peoples, but also from the slaves who for centuries have been halting here on their seaward journey from the interior of Africa.*

Coast peoples tend to show something more than the hybridism resulting from the mingling of two stocks. So soon as the art of navigation developed beyond its initial phase of mere coastwise travel, and began to strike out across the deep, all coast peoples bordered upon each other, and the sea became a common waste boundary between. Unlike a land boundary, which is in general accessible from only two sides and tends to show, therefore, only two constituent elements in its border population, a sea boundary is accessible from many directions with almost equal ease; it therefore draws from many lands, and gives its population a variety of ethnic elements and a cosmopolitan stamp. This, however, is most marked in great seaports, but from them it penetrates into the surrounding country. The whole southern and eastern coast population of England, from Cornwall to the Wash, received during Elizabeth's reign valuable accessions of industrious Flemings and Huguenots, refugees from Catholic persecution in the Netherlands and France.† Our north Atlantic states, whose population is more than half (50·9 per cent.) made up of aliens and natives born of foreign parents,‡ have drawn their elements from almost the whole circle of Atlantic shores, from Norway to Argentine and from Argentine to Newfoundland. Even the Southern States, so long unattractive to immigrants on account of the low status of labour, show a fringe of various foreign elements along the Gulf coast, the deeper tint of which on the census maps fades off rapidly towards the interior. The same phenomenon appears with Asiatic and Australian elements in our Pacific seaboard states.§ The cosmopolitan population of New York, with its "Chinatown," its "Little Italy," its Russian and Hungarian quarters, has its counterpart in the mixed population of Maskat, peopled by Hindus, Arabs, Persians, Kurds, Afghans, and Beluchis, settled here for purposes of trade, or the equally mongrel inhabitants of Aden and Zanzibar, of Marseilles, Constantinople, Alexandria, Port Said, and so many other Mediterranean ports.

The cosmopolitanism and the commercial activity that characterize so many seaboards are reflected in the fact that, with rare exceptions, it is the coast regions of the world that give rise to a *lingua franca* or *lingua geral*. The original *lingua franca* arose on the coast of the Levant during the period of Italian commercial supremacy there; it consisted of an

* F. Ratzel, 'History of Mankind,' vol. 2, pp. 530–533. London: 1898.

† H. D. Trail, 'Social England,' vol. 3, pp. 367–368. London and New York: 1895.

‡ Twelfth Census, Bulletin, No. 103, table 23. Washington: 1902.

§ Ellen C. Semple, 'America and its Geographic Conditions,' pp. 314–315, 318–323, 326–328. Boston: 1903.

Italian stock, on which were grafted Greek, Arabic, and Turkish words, and was the regular language of trade for French, Spanish, and Italians.* It is still spoken in many Mediterranean ports, especially in Smyrna, and in the early part of the nineteenth century was in use from Madagascar to the Philippines.† In the coastal strip of the Zanzibar Arabs, recently transferred to German East Africa, the speech of the Swahili has become a means of communication over a great part of East Africa, from the coast to the Congo and the sources of the Nile. It is a Bantu dialect permeated with Arabic and Hindu terms, and sparsely sprinkled even with English and German words.‡ "Pidgin English" (business English) performs the function of a *lingua franca* in the ports of China and the Far East. It is a jargon of corrupted English with a slight mixture of Chinese, Malay, and Portuguese words, arranged according to the Chinese idiom. Another mongrel English does service on the coast of New Guinea. The "Nigger English" of the West African trade is a regular dialect among the natives of the Sierra Leone coast. Farther east, along the Upper Guinea littoral, the Eboe family of tribes who extend across the Niger delta from Lagos to Old Calabar have furnished a language of trade in one of their dialects.§ The Tupi speech of the Brazilian coast Indians, with whom the explorers first came into contact, became, in the mouth of Portuguese traders and Jesuit missionaries, the *lingua geral* or medium of communication between the whites and the various Indian tribes throughout Brazil.‖ The Chinook Indians, located on our Pacific coast north and south of the Columbia river, have furnished a jargon of Indian, French, and English words which serves as a language of trade throughout a long stretch of the north-west Pacific coast, not only between whites and Indians, but also between Indians of different linguistic stocks.¶

The coast is the natural habitat of the middleman. One strip of seaboard produces a middleman people, and then sends it out to appropriate other littorals, if geographic conditions are favourable; otherwise it is content with the transit trade of its own locality. It breeds essentially a race of merchants, shunning varied production, nursing monopoly by secrecy and every method to crush competition. The profits of trade attract all the free population, and the labouring class is small or slave. Expansion landward has no attraction in comparison with the seaward expansion of commerce. The result is often a relative

* G. G. Chisholm, 'Commercial Geography,' p. 58. London: 1904.

† W. Roscher, 'Nationaloekonomik des Handels und Gewerbleisses,' note 18, p. 85. Stuttgart: 1899.

‡ F. Ratzel, 'History of Mankind,' vol. 2, p. 533. London: 1898.

§ Ibid., vol. 3, pp. 139, 145.

‖ H. R. Mill, 'International Geography,' p. 869. New York: 1902.

¶ D. G. Brinton, 'The American Race,' p. 107. Philadelphia: 1901.

dearth of local land-grown food stuffs. King Hiram of Troy, in his letter to King Solomon, promised to send him trees of cedar and cypress, made into rafts and conveyed to the coast of Philistia, and asked in return for grain, "which we stand in need of because we inhabit an island." The pay came in the form of wheat, oil, and wine. But Solomon furnished a considerable part of the labourers—30,000 of them—who were sent, 10,000 at a time, to Mount Lebanon to cut the timber, apparently under the direction of the more skilful Sidonian foresters.* A type of true coast traders is found in the Duallas of the German Kamerun, at the inner angle of the Gulf of Guinea. Located along the lower course and delta of the Mungo river where it flows into the Kamerun estuary, they command a good route through a mountainous country into the interior. This they guard jealously, excluding all competition, monopolizing the trade, and imposing a transit duty on all articles going to and from the interior. Like the ancient Phœnicians and Carthaginians, they avoid agriculture so far as possible. Their women and slaves produce an inadequate supply of bananas and yams, but crops needing much labour are wholly neglected, so that their coasts have a reputation for dearness of provisions.†

Along the 4500 miles of West African coast between the Senegal and the Kunene river the Negro's natural talent for trade has developed special tribes, who act as intermediaries between the interior and the European stations on the seaboard. Among these we find the Bihenos and Banda of Portuguese Benguela, who fit out whole caravans for the back country; the Portuguese of Loanda rely on the Ambaquistas and the Mbunda. The slave trade particularly brought a sinister and abnormal activity to these seaboard tribes,‡ just as it did to the East Coast tribes, and stimulated both in the exploitation of their geographic position as middlemen.§

The Alaskan coast shows the same development. The Kinik Indians at the head of Cook's inlet buy skins of land animals from the inland Athapascans at the sources of the Copper river, and then make a good profit by selling them to the American traders of the coast. These same Athapascans for a long time found a similar body of middlemen in the Ugalentz at the mouth of the Copper river, till the Americans there encouraged the inland hunters to bring their skins to the fur station on the coast.‖ The Chilcats at the head of Lynn canal long monopolized the fur trade with the Athapascan Indians about Chilkoot pass; these they would meet on the divide and buy their skins, which they would carry to the Hudson Bay Company agents on the coast. They guarded

* Josephus, 'Antiquities of the Jews,' book viii. ch. ii. 6, 7, 9.
† F. Ratzel, 'History of Mankind,' vol. 3, pp. 121, 122. London: 1898.
‡ Ibid., vol. 3, pp. 121, 132, 133.
§ Ibid., vol. 2, p. 239.
‖ Eleventh Census Report, 'Alaska,' p. 70. Washington: 1893.

their monopoly jealously, and for fifty years were able to exclude all traders and miners from the passes leading to the Yukon.*

The same policy of monopoly and exclusion has been pursued by the Moro coast dwellers of Mindanao in relation to the pagan tribes of the interior. They buy at Moro prices the forest and agriculture products of the inland Malays, whom they do not permit to approach either rivers or seaboard, for fear they may come into contact with the Chinese merchants along the coast. So fiercely is their monopoly guarded by this middleman race, that the American Government in the Philippines will be able to break it only by military interference.†

Differences of occupation, of food supply, and of climate often further operate to differentiate the coast from the inland people near by, and to emphasize the ethnic difference which is almost invariably present, either inconspicuously from a slight infusion of alien blood, or plainly as in an immigrant race. Sometimes the contrast is in physique. In Finisterre province of western Brittany, the people along the more fertile coastal strip are on the average an inch taller than the inhabitants of the barren, granitic interior. Their more generous food supply, further enriched by the abundant fisheries at their doors, would account for this increased stature; but this must also be attributed in part to intermixture of the local Celts with a tall Teutonic stock which brushed along these shores, but did not penetrate into the unattractive interior.‡ So the negroes of the Guinea Coast, though not immune from fevers, since they are better nourished on the fertile alluvial lowlands near the abundant fish of the lagoons, are often stronger and better looking than the plateau interior tribes near by. But here, again, an advantageous blending of races can not be excluded as a contributing cause.§ Sometimes the advantage in physique falls to the inland people, especially in tropical countries when a highland interior is contrasted with a low coast belt. The wild Igorotes, inhabiting the mountainous interior of northern Luzon, enjoy a cooler climate than the lowlands, and this has resulted in developing in them a decidedly better physique and more industrious habits than are found in the civilized people of the coasts encircling them.‖

Sometimes the difference is in shade of colour between two closely related tribes of the same race, due to the deeper pigmentation of the fishing, seafaring coast folk, especially in tropical regions. The coast Moros of western Mindanao are darker than the Subanos, their Malay brethren of the interior, the lightness of whose colour can be explained

* Eleventh Census Report, "Alaska," p. 156. Eliza R. Scidmore, 'Guidebook to Alaska,' p. 94. New York: 1897.

† Philippine Census, vol. 1, pp. 556–561, 575, 581–583. Washington: 1903.

‡ W. Z. Ripley, 'The Races of Europe,' pp. 85, 86, 99–101. With map, 151–152. New York: 1899.

§ F. Ratzel, 'History of Mankind,' vol. 3, pp. 97, 106. New York: 1898.

‖ Henry Gannett, "The People of the Philippines," in Report of the Eighth International Geographic Congress. Washington: 1904.

by their spending most of their lives in the forests.* So the Duallas of the Kamerun coast are darker than the Bakwiri inhabiting the forest slope of the mountains just behind them, though both belong to the Bantu group of people.†

Where a coast people is an immigrant stock from some remote over-sea point, it brings to its new home a surplus of energy which was perhaps the basis of selection in the exodus from the mother country. Such a people is therefore characterized by greater initiative, enterprise, and endurance than the sedentary population which it left behind or that to which it comes; and these qualities are often further stimulated by the transfer to a new environment rich in opportunities. Sea-born in their origin, sea-born in their migration, they cling to the zone of littoral, because here they find the conditions which they best know how to exploit. Dwelling on the highway of the ocean, living in easy intercourse with distant countries which would have been far more difficult of access by land-travel over territories inhabited by hostile races, exchanging with these both commodities and ideas, food-stuffs and religions, they become the children of civilization, and their sun-burned seamen the sturdy apostles of progress. Therefore it may be laid down as a general proposition, that the coasts of a country are the first part of it to develop, not an indigenous or local civilization, but a cosmopolitan culture, which later spreads inland from the seaboard.

Exceptions to this rule are found in barren, swampy, or inaccessible coasts like the Pacific littoral of Peru and Mexico, and on shores like those of western Africa and eastern Luzon, which occupy an adverse geographic location facing a neighbourless expanse of ocean and remote from the world's earlier foci of civilization. Therefore the descent from the equatorial plateau of Africa down to the Atlantic littoral means a drop in culture also, because the various elements of civilization which, since the days of Phœnician and Yemen seamen, have uninterruptedly filtered in from the Mediterranean and the Red sea, have rarely penetrated so far as the western rim of the highland, and hence never reached the coast. So the remote Adriatic face of Greece received only faint echoes from the joyous choruses of Ægean civilization; so the western shores of the Iberian peninsula and of the British isles, during the ancient and mediæval periods of history, had their backs turned on the tumult of life and trade and progress about the Mediterranean and North sea shores.

The long, indented coast of the Mediterranean has in all ages presented the contrast of a littoral more advanced in civilization than the inland districts. The only possible exceptions are to be found in ancient Egypt before Psammeticus began to exploit his mud-choked seaboard, and in northern Italy of the last two decades, since the utilization of

* Philippine Census, vol. 1, p. 552. Washington: 1903.

† F. Ratzel, 'History of Mankind,' vol. 3, p. 106. London: 1898.

Alpine water-power. This contrast was apparent, not only wherever Phœnicians or Greeks had appropriated the remote coast of an alien and retarded people; even in near-by Thrace the savage habits of the interior tribes were softened only where these dwelt in close proximity to the Ionian colonies along the coast, a fact as noticeable in the time of Tacitus as in that of Herodotus five hundred years before.* The ancient philosophers of Greece were awake to the deep-rooted differences between an inland and a maritime city, especially in respect to receptivity of ideas, activity of intellect, and affinity for culture.†

If we turn to the Philippines, we find that 65 per cent. of the Christian or civilized population of the islands live on or near the coast; and of the remaining 35 per cent. dwelling inland, by far the greater part represents simply the landward extension of the area of Christian civilization which had Manila bay for a nucleus.‡ Otherwise, all the interior districts are occupied by wild or pagan tribes. Mohammedanism, too, a religion of civilization, rims the southernmost islands which face the eastern distributing point of the faith in Java; it is confined to the coasts, except for its one inland area of expansion along the lake and river system of the Rio Grande of Mindanao, which afforded an inland extension of sea navigation for the small Moro boat.

Coasts are areas of out-going and in-coming maritime influences. The nature and amount of these influences depend upon the sea or ocean whose rim the coast in question helps to form, and the relations of that coast to its other tide-washed shores. Our land-made point of view dominates us so completely, that we are prone to consider a coast as margin of its land, and not also as margin of its sea, whence, moreover, it receives the most important contributions to its development. The geographic location of a coast as part of a thallasic or of an oceanic rim is the most potent factor in its history; more potent than local conditions of fertility, irregular contour, and accessibility from sea and hinterland. Everything that can be said about the different degrees of historical importance attaching to inland seas and open oceans in successive ages applies equally to the countries and peoples along their shores; and everything that enhances or diminishes the cultural possibilities of a sea—its size, zonal location, its relation to the oceans and continents—finds its expression in the life along its coasts.

The anthropogeographical evolution which has passed from small to large states and from small to large seas as fields of maritime activity has been attended by a continuous change in the value of coasts according as these were located on enclosed basins like the Mediterranean, Red, and Baltic; on marginal ones like the China and North seas; or on the open ocean. In the earlier periods of the world's

* Grote, 'History of Greece,' vol. 4, p. 22. New York: 1857.

† Ibid., vol. 2, pp. 225, 226.

‡ Philippine Census, vol. 2, pp. 34, 35, map, p. 28. Washington: 1903.

history, a location on a relatively small enclosed sea gave a maritime horizon wide enough to lure, but not so wide as to intimidate; and by its seclusion led to a concentration and intensification of historical development, which in many of its phases left models for subsequent ages to wonder at and imitate. This formative period and formative environment outgrown, historical development was transferred to locations on the open oceans, according to the law of human advance from smaller to larger areas; so the historical importance of the Mediterranean and the Baltic shores was transitory, a prelude to the larger importance of the Atlantic littoral of Europe, just as this in turn was to attain its full significance only when the circumnavigation of Africa and South America linked the Atlantic to the World ocean. Thus that gradual expansion of the geographic horizon which has accompanied the progress of history has seen a slow evolution in the value of seaboard locations, the transfer of maritime leadership from small to large basins, from thallasic to oceanic ports, from Lubeck to Hamburg, from Venice to Genoa, as earlier from the Piræus to Ostia, and later from England's little *Cinque Ports* to Liverpool and the Clyde.

Though the articulations of a coast determine the ease with which maritime influences are communicated to the land, nevertheless history shows repeated instances where an exceptional location, combined with restricted area, has raised a poorly indented seaboard to maritime and cultural pre-eminence. Phœnicia's brilliant history rose superior to the limitation of indifferent harbours, owing to a position on the Arabian isthmus between the Mediterranean and the Indian ocean at the meeting-place of Europe, Asia, and Africa. Moreover, the advantages of this particular location have in various times and in various degrees brought into prominence all parts of the Syrian and Egyptian coasts from Antioch to Alexandria. So the whole stretch of coast around the head of the Adriatic, marking the conjunction of a busy sea-route with various land-routes over the encircling mountains from Central Europe, has seen during the ages a long succession of thriving maritime cities, in spite of fast-silting harbours and impeded connection with the hinterland. Here in turn have ruled with maritime sway Spina, Ravenna, Aquileia,* Venice, and Trieste. On the other side of the Italian peninsula, the location on the northernmost inlet of the western Mediterranean and at the seaward base of the Ligurian Apennines, just where this range opens two passes of only 1800 feet elevation to the upper Po valley, made an active maritime town of Genoa from Strabo's day to the present. In its incipiency it relied upon one mediocre harbour on an otherwise harbourless coast, a local supply of timber for its ships, and a road northward across the mountains.† The maritime ascendency in the Middle Ages of Genoa, Pisa, Venice,

* Strabo, book v. ch. i. 7, 8.

† Strabo, book iv. ch. vi. 1, 2: book v. ch. i. 11.

and Barcelona proves that no long indented coast is necessary, but only one tolerable harbour coupled with an advantageous location.

Owing to the ease and cheapness of water transportation, a seaboard position between two other coasts of contrasted products, due to a difference either of zonal location or of economic development or of both combined, ensures commercial exchanges and the inevitable activities of the middleman. The position of Carthage near the centre of the Mediterranean enabled her to fatten on the trade between the highly developed eastern basin and the retarded western one. Midway between the teeming industrial towns of mediæval Flanders, Holland, and western Germany, and the new unexploited districts of unprogressive Russia, Poland, and Scandinavia, lay the long line of the German Hanseatic towns—Kiel, Lubeck, Wismar, Rostock, Stralsund, Greifswald, Anclam, Stettin, and Colberg, the *civitates maritimæ*, who for three centuries or more made themselves the dominant commercial and maritime power of the Baltic by exchanging Flemish fabrics, German hardware, and Spanish wines for the furs and wax of Russian forests, tallow and hides from Polish pastures, and crude metals from Swedish mines.* So Portugal by its geographical location became a staple place where the tropical products from the East Indies were transferred to the vessels of Dutch merchants, and by them distributed to northern Europe; later New England, by a parallel location, became the middleman in the exchanges of the tropical products of the West Indies, the tobacco of Virginia, and the wheat of Maryland for the manufactured wares of England and the fish of Newfoundland.

Primitive or early maritime commerce has always been characterized by the short beat, a succession of middlemen coasts, and a close series of staple places, such as served the North Indian ocean trade in Oman, Malabar coast, Ceylon, Coromandel coast, Malacca, and Java. Therefore, many a littoral admirably situated for middleman trade loses this advantage so soon as commerce matures enough to extend the sweep of its voyages, and to bring into direct contact the two nations for which that coast was intermediary. This is only another aspect of the anthropogeographic evolution from small to large areas. The decline of the Mediterranean coasts followed close upon the discovery of the sea-route to India; nor was their local importance restored by the Suez canal. Portugal declined when the Dutch, excluded from the Tagus mouth on the union of Portugal with Spain, found their way to the Spice isles. Ceylon, though still the chief port of call in the Indian ocean, has lost its pre-eminence as chief market for all the lands between Africa and China, which it enjoyed in the sixth century A.D., owing to the "long haul" of modern oceanic commerce.

Not only that far-reaching readjustment of maritime ascendency

* Dietrich Schäfer, 'Die Hansestädte und König Waldemar von Danemark,' pp. 184, 189. Jena: 1879.

which in the sixteenth century followed the advance from thallasic to oceanic fields of commerce, but also purely local political events may produce as striking changes in the use or importance of coasts. The Piræus, which had been the heart of ancient Athens, almost wholly lost its value in the checkered political history of the country during the Middle Ages, when naval power and merchant marine almost vanished; but with the restoration of Grecian independence in 1832, much of its pristine activity was restored. Up to the beginning of the seventeenth century, Japan had exploited her advantageous location and her richly indented coast to develop a maritime trade which extended from Kamchatka to India; but in 1624 an imperial order withdrew every Japanese vessel from the high seas, and for over two hundred years robbed her busy littoral of all its historical significance. The real life of the Pacific coast of the United States began only with its incorporation into the territory of the Republic, but it failed to attain its full importance until our acquisition of Alaska, Hawaii, and the Philippines. So the coast of the Persian gulf has had periods of activity alternating with periods of deathlike quiet. Its conquest by the Saracens in the seventh century inaugurated an era of intense maritime enterprise along its drowsy shores: what new awakening may it experience, if it should one day become a Russian littoral!

Sometimes the decline in historical importance is due to physical modifications in the coast itself, especially where the mud transported by a great river to the sea is constantly pushing forward the shoreline. The control of the Adriatic passed in turn from Spina to Adria, Ravenna, Aquileia, Venice, and Trieste, owing to a steady silting up of the coast.* Strabo records that Spina, originally a port, was in his time 90 stadia, or 10 miles, from the sea.† Bruges, once the great *entrepôt* of the Hanseatic League, was originally on an arm of the sea, with which it was later connected by canal, and which has been silted up since 1432, so that its commerce, disturbed too by local wars, was transferred to Antwerp on the Scheldt.‡ Many early English ports on the coast of Kent and on the old solid rim of the Fenland marshes now lie miles inland from the Channel and the Wash.

A people never utilizes all parts of its coasts with equal intensity, or any part with equal intensity in all periods of its development; but, according to the law of differentiation, it gradually concentrates its energies in a few favoured ports, whose maritime business tends to become specialized; while every extension of the subsidiary territory and intensification of production with advance in civilization increases the mass of men and wares passing through these ocean gateways. The

* W. Deecke, 'Italy,' pp. 89–91. London: 1904.

† Strabo, book iii. ch. i. 2.

‡ W. Roscher, 'Nationaloekonomik des Handels und Gewerbfleisses,' p. 93, note l. Stuttgart: 1899.

shores of New York, Delaware, and Chesapeake bays are more important to the country now than they were in early colonial days, when their back country extended only to the watershed of the Appalachian system. Our Gulf coast has gained in activity with the South's economic advance from slave to free labour, and from almost exclusive cotton planting to diversified production combined with industries; and it will come into its own, in a maritime sense, when the opening of the Panama canal will divert from the Atlantic outlets those products of the Mississippi basin which will be seeking trans-Pacific markets.

A careful analysis of the life of coast peoples in relation to all the factors of their land and sea environment shows that these are multiform, and that none are negligible; it takes into consideration the extent, fertility, and relief of the littoral, its accessibility from the land as well as from the sea, and its location in regard to outlying islands and to opposite shores, whether near or far; it holds in view not only the small articulations that give the littoral ready contact with the sea, but its relation to the larger continental articulations, whether it lies on an outrunning spur of a continental mass, like the Malacca, Yemen, or Peloponesian coast, or upon a retiring inlet that brings it far into the heart of a continent, and provides it with an extensive hinterland; and, finally, it never ignores the nature of the bordering sea, which furnishes the school for the learning of seamanship and fixes the scope of maritime enterprise.

But all these various elements of coastal environment are differentiated in their use and their influence according to the purposes of those who come to tenant such tide-washed rims of the land. Pirates seek intricate channels and hidden inlets for their lairs; a merchant people select populous harbours and navigable river mouths; would-be colonists settle upon fertile valleys opening into quiet bays, till their fields, and use their coasts for placid maritime trade with the mother country; interior peoples, pushed or pushing out to the tidal periphery of their continent, with no maritime history behind them, build their fishing villages on protected lagoons, and, unless the shadowy form of some outlying island lure them farther, there they tarry, deaf to the siren song of the sea.

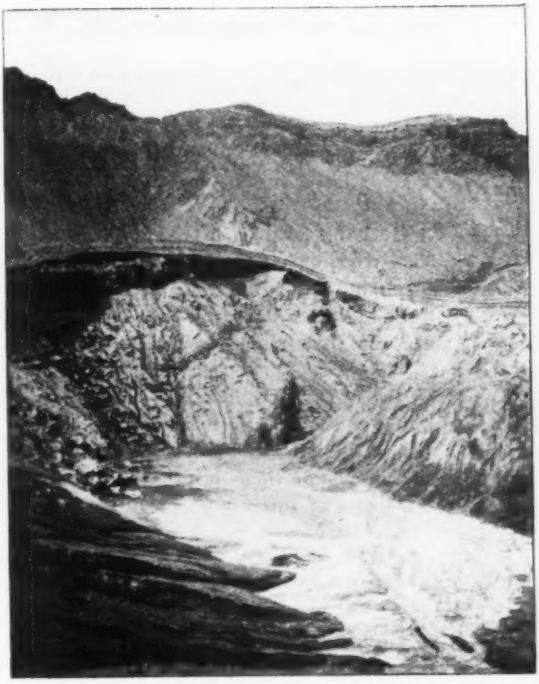
NOTES ON THE PHYSIOGRAPHY OF CERTAIN VOLCANOES IN NORTHERN JAPAN.

By C. E. BRUCE MITFORD.

Of the four "lines of weakness" which, marked by volcanic ranges, traverse the islands of Japan, the greatest is that which extends in a well-defined anticlinal curve from south-western Yezo along the backbone of Hondo to the lofty transverse upfold of the so-called Japanese Alps. At several points in this line subsidiary lines of fracture, running

KOMAGATAKE FROM LAKE ONUMA.

THE KOMAGATAKE OF YEZO: ANCIENT WALL AND PINNACLE.



THE KOMAGATAKE OF YEZO: MAIN INNER CRATER.

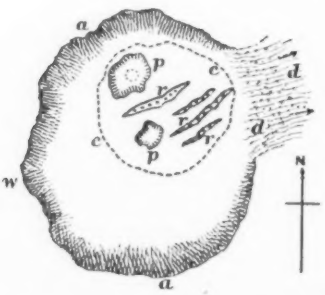
THE SHIRANESAN OF KUSATSU: GENERAL VIEW OF THE CRATER AND LAKES.

westward, have caused a widening of the volcanic area into broad zones. It is in these broader zones of upheaval that activity is still displayed. Where the volcanoes form a narrow band, or a single chain, it has ceased.

The first of these zones is that of south-western Yezo, which almost completely surrounds Volcano bay. It contains the active craters of Noboribetsu and Usui on the north side, and Komagatake and Esan on the south, of this nearly circular inlet. Then, in Hondo, follows the mass of volcanic mountains surrounding Lake Inawashiro and continued southwards into the Nikko group. In this zone also are four active craters—Azumayama, Bandaisan, Nasuyama, and the Shiranesan of Yumoto (Nikko). The last of these zones, owing to its intersection by the subsequently opened Fuji-Oshima line, is the broadest. Here the peaks are both loftier and more numerous. Two large active craters remain—Asama in the centre line, and the Shiranesan of Kusatsu some 20 miles to the north. Some of these peaks are comparatively little known, and present features of interest which it is proposed here to illustrate.

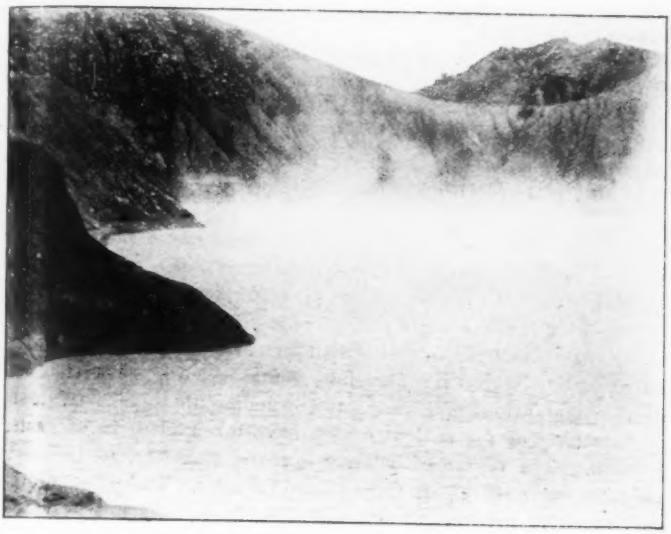
1. The Komagatake of Yezo.

This is a comparatively ancient volcano, within which a considerable degree of activity on a small scale is still displayed. The old crater, distinguished from afar by the lofty peak in which its western wall culminates, has been breached on the north-east side. The three lakes (of which Onuma is the largest), formed at the base of the mountain by an eruption in comparatively recent times, are on the opposite (south-west) side. The ancient crater has a circumference of 1½ mile, and a depth, below the western pinnacle, of 600 feet. Near the gap on the seaward side a new cone has been thrown up, broad and low. No mention of this new cone has been made either by Captain Bridgford or Prof. Milne, who visited the spot in 1872 and 1877 respectively. The former (*Transactions of the Asiatic Society*, vol. 2, p. 80) speaks of six smaller craters, one of which was then active; the latter (*Transactions of the Seismological Society*, vol. 11 (a volume of 184 pages



Plan of the Crater of Komagatake, Yezo.

a, a Ancient crater wall (the cross shading indicates rounded ridges). *d, d* debris of breach. *w* western pinnacle. *c, c* low inner cone. *p, p* pit craters. *r, r'* parallel rifts with steam vents



SHIRANESAN: THE CENTRAL LAKE, WEST SIDE.

BLASTED TREES ON SHIRANESAN (CRATER IN THE DISTANCE).

describing 100 volcanoes), part 2) mentions only one small crater "with fissures running to it."

Changes may have taken place since then, probably in the course of a slight eruption which two summers ago covered the country-side to the east and north-east with a thin layer of ashes. The present configuration of the area within the low cone above mentioned is as follows (see plan):—(1) Circular pit-crater 40 yards in diameter and 30 to 40 feet deep, with low truncated cone in centre. The cone has no orifice, but is surrounded by a viscous mixture apparently of mud and sulphur, from which a little steam issues. (2) A deep narrow rift running east (towards the breach) containing five small vents discharging steam. (3) A smaller pit-crater, extinct. The rift lies between the two craters, and is joined further east by (4) several longer rifts which run parallel with the first on to the very flank of the cone, the last of the numerous vents steaming most vigorously. All recent eruptions of Komagatake, including that which resulted in the breaching of the ancient crater, have taken place in an easterly direction. The centre of activity appears, therefore, to be moving gradually eastward along these lines of fissure. The "lie" of these lines, precisely between Onuma and the breach, may not be without significance.

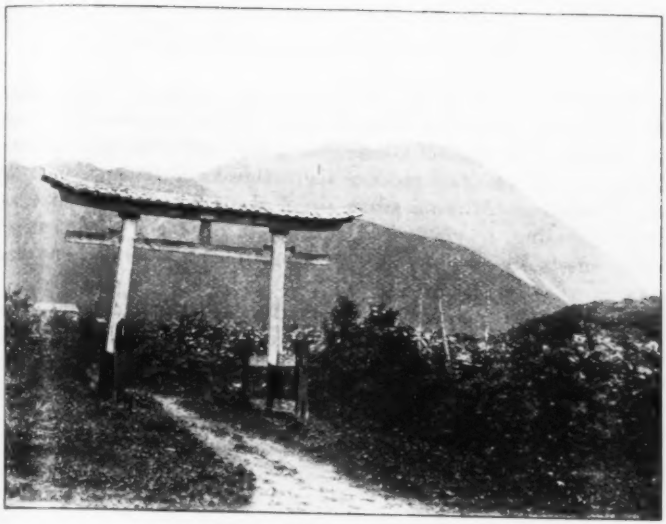
2. Esan.

This volcano rises boldly from the north-east entrance of Tsugaru strait to a height of nearly 2000 feet. It is surrounded on three sides by the sea; and the crater, which is deep and finely formed, is breached on the side (west) away from the sea. By the gap thus made the crater can be entered. Steam and sulphurous vapours issue from many crevices in the precipitous and rocky walls of the crater, especially on the east or seaward side, imparting strange colours to the cliffs. The principal vent is centrally situated in the crater floor. It consists of a sharp-edged oval aperture, some 20 feet in its longest diameter. In the centre of it rises a sharp lava cone, apparently trachytic, its sides making an angle of 70° with the horizontal. From the eastern end of the vent a violent and continuous discharge of steam takes place, somewhat laterally, towards the central cone. The water of the stream flowing out of the crater of this volcano past some sulphur-diggers' huts contains free sulphuric acid.*

3. Azumayama.

This prominent peak rises from a sea of volcanic mountains to the north of Lake Inawashiro, within 10 miles of the famous Bandaisan,

* When Prof. Milne visited Esan in 1878, the weather was, he says, too foggy to see much. Consequently, by such statements as "the only evidences of true volcanic action were a few cinders embedded in the mud," justice is not done to this fine volcano

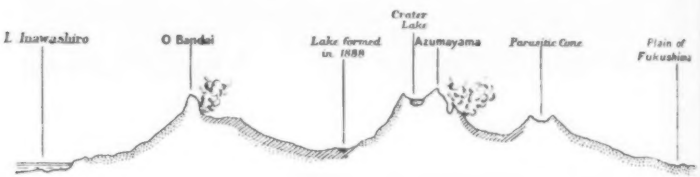


THE VOLCANO OF ESAN, FROM THE SOUTH.

THE CRATER OF ESAN, SHOWING CENTRAL VENT.

and 40 of Nasuyama, along the central axis of Hondo. These three volcanoes, long considered distinct, have broken out into destructive activity within the space of a dozen years (1893, 1888, 1881). Curiously enough, the chronological order of the outbreaks corresponds with the order of position. All three peaks are of about the same height (6000 feet)—suggesting, *ceteris paribus*, equality of age; and, their summit craters effectually sealed, all have broken out laterally on their flanks.

It is a noteworthy circumstance that with Bandaisan and Azumayama, as well as the Komagatake of Yezo, the explosions have taken place on the side opposite to the lakes formed at their respective bases (see diagrammatic section). Lake Inawashiro was in all probability the



Diagrammatic Section (N.N.E., S.S.W.) of Bandaisan and Azumayama

Vertical scale exaggerated 2½ times

Ancient Debris or Lava Flows. Alluvium Recent

predisposing circumstance of the explosion on Bandaisan (1888). At that time three lakes came into being in the valley between it and Azumayama. In 1893 the latter, supposed extinct, burst into eruption on the north-east side.

The summit crater of Azuma is occupied by a lake a quarter of a mile in diameter. The sides are steep, and in places beautifully wooded. The wall crater rises to its highest in a bare rounded peak on the north side. The present active crater stands at about the same elevation as the lake. A vertical section would show the form of a fish-hook, with the barb outwards; a horizontal section would be an oval. The cliffs, terminating in a perpendicular rift on the upper side, have a height of 400 feet; the extreme width is about the same. The floor of the crater has two vents, now covered with mud. From the lower or eastern end a large quantity of steam is discharged with vigour. That the crater as a whole evolves a considerable degree of heat is evinced by the loud roaring which rises continually from it. A short distance below, the mountain is lined with solfataras, forming the termini of parallel fissures which run for some distance down the mountain-side. Strongly sulphurous vapours issue incessantly in great volume. The orifices, from 1 to 2 feet in diameter, are many of them half hidden by overhanging stalactites of

sulphur. The greater part, however, collects below in vivid yellow masses.

On the north-east side of Azumayama, at a height of about 4500 feet, there is a large parasitic cone with a well-formed crater, extinct, about a quarter of a mile in diameter. The angle of rest is approximately 30°.

4. Bandaisan.

The volcano of Bandaisan has already been the subject of much description, but none of the accounts published are perfectly consistent with one another. It is, moreover, impossible to ascertain with any precision the topographical features of the mountain group prior to the great explosion. It is generally admitted that the peaks (4) surrounding the level plain known as the *Numa-no-taira* formed part of an ancient crater ring which had been breached, and lay open to the north. The width of this ancient crater, from O-Bandai to the breach, was about a mile. Ko-Bandai, the destroyed mountain, occupied a position a little to the north of O-Bandai, and partly overlapping it. This suggests that the former was a parasitic cone of unusual dimensions, built up on the northern flank of O-Bandai after the great cataclysm which resulted in the formation of the crater ring. The previous breaching explosion had made a vast inclined plane leading from the edge of the ancient crater floor to the valley below, down which the broken fragments of Ko-Bandai, and the mud engendered by the immense quantities of steam, rushed with accelerated force. The photographs show the aspect of the devastated area in April, 1907. The hollow at the lower lip of the fracture was filled with snow, though the slope leading up from it was steaming from numerous small vents.

5. Nasuyama.

This volcano, 6300 feet high, is remarkable for the uncommon disposition of its craters. For 500 feet down from its sharply peaked summit, the western side of the cone is riddled with active vents, great and small. Just below the summit lies the principal and original crater, some 200 feet in width, and marked from afar by a great cloud of steam. Immediately above the limit of vegetation (5700 feet), a mass of sulphurous vapour indicates the position of the second large vent. This is a sombre pit, some 80 feet in depth, with abrupt perpendicular walls, which passes under an arch of grey rock horizontally into the bowels of the mountain. The vapours from this crater are discharged with a hot blast laterally.

Between the two craters, a number of solfataras send forth their

BANDAISAN FROM LAKE MAWASHIRO.

BANDAISAN. IN THE MIDST OF THE *DÉBRIS*, THE NEW BED OF THE NAGASE-GAWA.

suffocating vapours westward in great volume and with a deafening noise.

The waters of the hot springs on the mountain-side are strongly acid.

NASUYAMA: THE SUMMIT CRATER FROM THE SOUTH-WEST.

CRATER LAKE OF AZUMAYAMA.

6. The Shiranesan of Kusatsu.

Three lakes, separated by narrow walls, occupy the great crater of the Shiranesan of Kusatsu. The sides of the cone, as well as the lake-basins, are composed of grey tuff and sulphur, which the abundant moisture keeps in a pasty state, and through which, in places, andesitic rock crops out in bold cliffs and pinnacles. As a whole, the crater is oval, but the lakes are circular. The total length of the crater is a little over half a mile. The central lake-basin, the water of which is boiling in the north-western part, is itself a quarter of a mile in diameter. A small stream flows from the south lake into the central one, but there is no such connection between the central and the northern, which occupies a slightly higher level.

All the lakes appear to be diminishing in size. At the time of the eruption of 1882, from which the present period of activity dates, the water of the central lake stood only 20 to 30 feet below the edge of the crater wall; it is now 100 feet below. For a full year after that eruption, a geyser-like activity was displayed, grey mud, boiling water, and stones being shot in a column to a height of 50 feet. A sulphur factory was then built near the edge of the crater wall, but was destroyed in a subsequent eruption, when the geyser again became active.

A feature of Shiranesan is its blasted trees, the work of the eruption of 1882. The noxious fumes given off on that occasion destroyed pines on neighbouring mountains at a distance of $2\frac{1}{2}$ miles from the crater.

A sample of water from the south lake (September, 1907), on being tested, showed no hydrochloric acid.* Sulphates of iron and, to a small extent, of aluminium were present, together with a considerable proportion of free sulphuric acid. The hot springs of Kusatsu, at the foot of the mountain, owe their efficacy to the presence of the same acid.

In conclusion, we may remark that along the whole line, from Yezo to Shiranesan, a general recrudescence of volcanic activity has taken place within the last twenty-five years; that the mountains in the Hindo portion of the line, with the exception of the Nikko group (which are a little higher), have an average elevation of 6500 feet approximately; that the majority of the craters have been breached, or have broken out laterally; and that this has occurred in several instances on the side remote from lakes formed at the base of the mountain in comparatively recent times. As pointed out by Prof. Milne, the rocks of the northern volcanoes are more acidic than those of the southern volcanoes, and this is borne out by the generally acid character of the hot springs issuing from them.

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* The water of these lakes is said by the editors of Murray's 'Handbook to Japan' (p. 187), to consist of "hydrochloric acid, with iron and alum. . . ."

AN EARLY SIXTEENTH-CENTURY MAP OF THE WORLD.*

A curious little map, dating from the second decade of the sixteenth century, has lately been obtained by Mr. H. Ruffer, a Fellow of our Society, through the well-known bookseller of Milan, Signor U. Hoepli. Its present owner having obligingly offered to bear the major portion of the expense of reproduction, we are enabled to give a facsimile in the present number of the *Journal*. Nothing appears to be known of the history of the map, which purports to be by Fra Michiel Barbolan, and to have been drawn at Venice in 1514. It bears the title 'Universal Orbe della Tera,' and though giving a very slight and general view of the then-known world, offers some points of interest. As in other maps of the period, produced on the more literary side of geography, it shows many traces of the Ptolemaic influence, and makes no attempt to lay down accurately the results of nautical discovery. But it may help to cast a side light on the diffusion of geographical ideas, and the genealogy, so to say, of cartographical documents, in the period then closing, in which Italy had occupied so distinguished a position, though no doubt many Italian productions in this field are now lost.

Of the four dozen names inserted in the map, most, it will be seen, represent countries rather than cities. The principle of selection is not very apparent, and in a slight sketch of the kind we should hardly have expected to find names like Finland, Riga, and La Rochelle. On the other hand, the names inserted for the more distant parts of the world show the author to have had some knowledge of the more important countries, and of centres of commerce like Aden and Malacca. Indications of his religious sympathies are to be seen in the representation of Jerusalem, in the coat-of-arms in the top left-hand corner, and possibly in the red cross of the ship sailing towards Hispaniola, which island seems singled out for special notice by being shown in gold. Mr. Ruffer suggests that Fra Barbolan may have been interested in missionary enterprise.

Among the maps with which it is natural to compare the present specimen are those of the Ptolemys of Rome (1508), Venice (1511), and Strassburg (1513), with others of Waldseemüller's productions comparable with the last-named. In one respect, at least, it shows an improvement on the more pretentious effort of Sylvanus in the 1511 Ptolemy (brought out in the same city only three years earlier), for there is a more correct presentation of the two Indian peninsulas, flanked by Ceylon and Sumatra, and with the name Malacca on the more easterly of the two, as in Ruysch's map in the Ptolemy of 1508 and in Waldseemüller's of 1513. In the name "Russia blanca" we have a further point of resemblance with the World-map of 1513,

* Map, p. 244. The scale of the original has been reduced by about one-fourth.

though in this the name is derived from an earlier map of *Italian* provenance—that of Martellus of 1489—from which (or from a common prototype) a large part of the 1513 map was closely copied (cf. *Journal*, vol. 23, p. 764). The original authority for the term seems to be the famous map of Fra Mauro (1459)—itself produced in Venice and probably known to Fra Barbolan—which shows not only "Rossia biancha," but "Rossia negra" and "Rossia rossa," explaining the terms as derived from the White sea and the Black and Red rivers.* The name "Thebet," found in comparatively few maps of the time, had already appeared in Fra Mauro's, who also located the islands of Ceylon and Sumatra ("Taprobana") in correct relation to the two Indian peninsulas, showing here, as elsewhere, a knowledge much in advance of his time.

Although Fra Barbolan does not fill in the extreme east coast of Asia, it seems probable that this is due, as in Waldseemüller's 'Carta Marina' of 1516, merely to want of space, and that the map really belongs to the type so much in vogue at the time, in which the continent is bounded eastward by a wide ocean, separating it from the New World, though the conception is marred by the retention of Ptolemy's eastern coast of the Sinus Magnus, involving the strange excrescence to the south-east of the continent. It is possible, however, that the author was intentionally adopting a non-committal attitude on this question. Perhaps the most remarkable feature in the map is the junction of Europe with the New World by the extreme north, though this, after all, is an easy step, if a purely speculative one, from the many earlier maps in which Greenland was shown as a long narrow peninsula attached to North-West Europe. This feature seems another characteristic of Italian workmanship, pointing to the probability of the former existence of now-lost links in the chain of evolution. Thus it recurs again with equal definiteness more than thirty years later, in another Venice map—that of Gastaldi in the Ptolemy of 1548, while it seems to be hinted at in some, at least, of the maps of the Battista Agnese school.

As regards the American portion, the author displays unusual boldness, for the time, in piecing together the scattered fragments, from Labrador to Florida, into a continuous continental mass. He avoids the confusion as to the true character of Cuba displayed by so many of his contemporaries, including even Ruysch and Waldseemüller. In South America the use of the name Brazil forms another,

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* It is curious that most of the later maps reproduce only the "White Russia," though that in the 'Margarita Philosophica' of 1515 has also "Russia rubra." The vitality of the term "White Russia" in the maps (especially Italian) of the sixteenth century is probably an instance of slavish copying by map-makers. It is found as late as 1566 in Gastaldi's map of Russia, reproduced in Muller's 'Remarkable Maps.'

if an accidental, link with the work of the last-named, whose maps of 1515 and 1516 have hitherto been the earliest known specimens to adopt the new designation for the "Terra Sancte Crucis." But as Fra Barbolan's map is a year before the earlier of these, it may be that here again the Alsatian map-maker was drawing upon some Italian source.

REVIEWS.

ASIA.

Ancient Khotan.

'Ancient Khotan: Detailed Report of Archæological Explorations in Chinese Turkestan.' Carried out and Described under the Orders of H.M. Indian Government by M. Aurel Stein, Indian Educational Service. Oxford: at the Clarendon Press. 1907.

When, in the *Geographical Journal* of June, 1906, the scientific results of Dr. Sven Hedin's journey in Central Asia (1899–1902) were considered, the main point of physical interest was found to be the battle between water and sand—the latter from the east aggressive, and the former from the west defensive; whilst the issue, though fluctuating, appeared so far to have been favourable to the assailant. Cultivation and irrigation, there interdependent, have shrunk, and the desert has advanced. Cities, roads, and the rivers themselves have been obliterated, save when the wind has laid bare the ruins which the sand had first submerged and then preserved. So its action has not been solely destructive; indeed, to its protection Dr. M. A. Stein owes the materials for his detailed report of archæological exploration in the neighbourhood of Khotan, and in what may be described as the south-western and southern part of the Takla Makan. Both of these explorers have published popular accounts of their journeys, followed by lengthy reports of results, the one book being more or less a complement of the other.

Dr. Stein's report, now under consideration, is dedicated to Sir Henry Yule, "the great elucidator of early travel and a pioneer in the historical geography of Central Asia," with a feeling of admiration and respect for that learned man which is highly commendable and is widely entertained. Its scope may be gathered from the title, whilst the region in which research was carried on was fixed, we are told, by "the important find of ancient birch-bark leaves, containing a Buddhist text in early Prākrit and in Kharosthī writing, of which M. Dutreuil de Rhins had acquired a portion during his stay at Khotan." These fragments, on examination, were recognized as the oldest Indian manuscript then known, and the Government of India was induced to employ its agents to procure relics from Chinese Turkistan.

As usual, supply followed demand; but after much profound inquiry and deliberation by experts, doubt was cast on the finds, specially of manuscripts and block-prints obtained from treasure-seekers. That the suspicion was well founded it has been Dr. Stein's good fortune to establish; inquiry, semi-antiquarian, semi-judicial, held at Khotan, enabled him to clear up the mystery of these strange documents in unknown characters, which "not only figured conspicuously in the 'British Collection of Antiquities from Central Asia,' found at Calcutta, but had found their way also to public collections in London, Paris, St. Petersburg, and probably elsewhere." The forger, Islam Akhun, was at first shy and protested his innocence; he was merely an agent for certain persons at Khotan now dead, for the

sale of old books to purchasers in Kashgar; and he lamented, if there had been fraud, that he alone was left to bear the burden. His position was strong, but it was skilfully turned; the doctor was able to confront him with exact reproductions of the elaborate stories he had told, and partly delighted with the permanent record his inventions had obtained, and partly because he was assured that no punishment was contemplated, he eventually confessed and explained the plan he had followed to produce the article required by the sahibs. He was immensely impressed by the perfect photographic reproductions of his own handiwork, and at once grasped the idea that this art could be utilized with great success in the perpetration of further fraud; consequently, he prayed to be allowed to accompany the Doctor to Europe, where he might find a wider field for his peculiar talents.

But Dr. Stein not only exposed the false records, but may claim to have procured many genuine writings and relics which confirm what is known of the introduction of Buddhism from India, and demonstrate the influence of Indian language and art in these remote regions. His detailed report describes, perhaps too minutely, but with evident and scrupulous accuracy, how these were obtained; it may conveniently be divided into three main heads: the history of that part of Chinese Turkestan and its neighbouring countries; their geography; and descriptions of the ancient sites and the various relics discovered.

The history is extremely interesting, though often obscure, and much reading and study are required before a reasonably clear grasp of the subject is obtained. For we have to learn who the old inhabitants were, and who and what were their neighbours. Evidence seems to show that the people of Khotan are mainly of Arian stock, similar in most respects to the inhabitants of Wakhan and Sarikol, with an admixture of Turk and Tibetan blood. The Indian element was present before the introduction of Buddhism, and tradition points to Taxila as the source, with Gandhara and Kashmir as the routes of migration. The story is that King Asoka's eldest son, Kunāla, who was governor of Taxila, had his eyes put out by a wicked step-mother. When the news reached the king, his anger was so great that he banished all the principal inhabitants to Khotan, "a sandy desert to the north-east of the Snowy mountains." There the exiles established themselves, and elected a king, who laid the foundations of a city which became the capital of the kingdom. It had many vicissitudes, not always easy to trace; but, taken with Kashgar and the neighbouring countries, it may be said, in a general way, that Chinese influence and suzerainty prevailed, though interrupted for considerable periods, and that Buddhism was introduced about 120 A.D. The Huns, driven from China, their ancient and perhaps original seat, set forth westwards in two great divisions towards the Oxus and Volga. The first division "established their dominion in the fruitful and extensive plains of Sogdiana, on the eastern side of the Caspian, where they preserved the name of Huns, with the epithet of Euthalites, or Nepthalites." * These people, the White Huns, who arrived in the first century of our era, by the middle of the fifth ruled Eastern Turkistan, and had carried their conquests to Gandhara and the Indus. In turn they were overthrown by the Turks, called by the Chinese Tu-kiu, said to have come from the slopes of the Altai, where they were employed by the Khan of the Geougen in mining and smelting iron. Next the Saracens, about 710 A.D., bringing with them the religion of Mohammed, drove the Turks to the desert, occupied Transoxiana, and improved its commerce. "The mutual wants of India and Europe were supplied by the diligence of the Sogdian merchants, and the inestimable art of transforming

* Gibbon's 'Roman Empire,' chap. xxvi. These are the Hephthalites, Chinese I-ta, Yeh-tas whose original country was occupied by a tribe called Geougen.

linen into paper has been diffused from the manufactures of Samarcand over the Western world." *

Besides these changes there are the movements of the Scythians, Moguls, Tartars, and Turks, which culminated, so far as we are at present concerned, with the prosperous reign of Malik Shah, who crossed the Jaxartes and subjugated Turkistan, and the conquests in the thirteenth century, of Temugin, better known by his title of Chinghiz, Jingis, or Zingis Khan. His grandson was Kúblái, the Great Káán of whom Marco Polo has told us the story, and by whom the capital Cambaluc or Peking was built.

Marco Polo's description of Khotan, whose people, he records, "are subject to the Great Kaan, and are all worshippers of Mahommet," is still fairly correct. He says, "There are numerous towns and villages in the country, but Cotan, the capital, is the most noble of all, and gives its name to the kingdom. Everything is to be had there in plenty, including abundance of cotton. The people have vineyards and gardens and estates. They live by commerce and manufactures, and are no soldiers." † The more recent history of Khotan need not be detailed. The ancient capital, where Yotkan now stands, was abandoned, presumably after the eleventh century, and the country has for the most part been subject to China, though there have been rebellions, that of Ya'kub Beg of Kashgar being the most recent.

The additions to our geographical knowledge of those regions are mainly the results of Surveyor Ram Singh's surveys of the country about the Karatash pass, Khanarik, in Kuen Lun, in the desert, and at the ruins. Dr. Stein gratefully acknowledges his services and the obligation he is under to the Department for providing an assistant so able and so willing.

Turning now to the last and most important part of the work—the search for relics—full descriptions are given in chap. iv. of investigations near Kashgar and Yarkand, in chaps. v. and viii. of those from Karghalik to Khotan, and in the Khotan oasis. The site of the ancient capital at Yotkan, and the excavation for treasure and relics carried on like mining operations, the soil being washed by the aid of a river, are well described, and the finds are duly figured in the plates (vol. 2). When marching to the Khotan oasis, Dr. Stein passed the remarkable Kaptar Mazar, or Shrine of the Pigeons, where thousands of the birds, perfectly tame, are maintained by the offerings of travellers and the proceeds of other endowments. There is, of course, a legend which is duly recorded, and the site is not remote (may be the same) from the "succession of small hills," formed by the burrowing of rats, mentioned by Hsuan-tsang. The rats were as big as hedgehogs, and daily marched out, following a rat chief who saved Khotan from an invasion of the Huns.

Then various sites eastwards towards Charchan as far as the Endere river were visited; of these the most prolific seem to have been Dandan Uilig; a site beyond the Niya river; and the Endere ruins. Besides art relics, documents in various characters on wood, leather, and paper were obtained. Some are Chinese, others Tibetan, but the greater number, we gather, are Kharosthi in script, Prakrit in dialect. Some progress in deciphering them has been made, but the process is still incomplete. They go to prove the use of an Indian language in the records which are not in Chinese, and reproductions will be found in the volume of plates. Of these there are in all one hundred and nineteen of great excellence; but the number of objects pictured—frescoes, sculptures, terra-cottas, panels, seals, etc.—vastly exceed that number.

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* *Vide* chap. li.

† Yule's 'Marco Polo,' vol. 1, p. 188 (3rd edit.).

The energetic and thoroughly consistent manner in which Dr. Stein has set about his explorations and their record deserves warm acknowledgment, and must form matter of congratulation to the Government of India. Transliteration of native names, that terrible stumbling-block, is a matter of very considerable importance, seeing that through it correct pronunciation is attainable, which without it is practically impossible. The want of a sound and reliable system adds enormously to the labour of reading, except in the most perfunctory manner, and this might be saved by proper care in writing. The system adopted for Chinese words by Dr. Stein, which he owes to M. Chavannes, is presumably correct if French values to the letters be given; but it is such as to be misleading to an English reader. The well-known Buddhist monk, Hiuen Tsang, becomes Hsüan-tsung; Si-yu-ki, the Buddhist records translated by Beal, is printed Hsi-yü-chi; Chê-chü-chia, Karghalik, or a town which was near it, is pronounced (we gather from the French *Tcho-keou-kia*) Cho-kiu-kia; Kia-che (Chia-Shih) is presumably pronounced Kia-shi, and if so, Kia-che would seem to be transliterated half in English and half in French fashion. It is most confusing to substitute *ch* for *k*, *u* for *a* short, and *ch* for *sh* when attempting to render oriental words in the English language.

Dr. Stein is now engaged on farther research in the Takla Makan; he has got relics from ruins north and south of Lob-nor, and has sent them to Kashgar, but has himself followed the route towards China used by Hsüan-tsang and Marco Polo. In or about the ruined watch-towers he has found many Chinese documents, and, with the help of Rai Ram Singh, has added some useful survey work in the Nan-shan range. Let us hope, when the report of this work is written, that either native names may be written in native character as well as in English, or that a good system of transliteration may be followed.

W. Broadfoot.

Central Asia.

'Durch Asien.' By Dr. K. Futterer (continued by Dr. Fritz Noetling). Vol. 2. 'Geologische Charakter-Bilder.' Erster Teil. Berlin: Dietrich Reimer. 1905.

The geological results of Dr. Futterer's journey across Central Asia in the year 1898 are to appear in three parts, of which this is the first. It includes the field notes on the earlier part of the expedition, and describes the author's traverses of the Alai mountains, portions of the Kuen Lun chain, the Tarim desert, and the desert of Gobi. Part of the ground has been described by Kuropatkin and Sven Hedin; but large collections were made, and there is reason to believe that much new information was obtained by Dr. Futterer. Unfortunately, illness prevented him from completing his account of these investigations, but the editing of this volume has been placed in the hands of Dr. Noetling. The second part will contain the remainder of the field notes, while the third will be devoted to special subjects—such as petrography and palæontology.

The field notes are given in the form of a journal, in which chemical and other data are incorporated, and are rendered more intelligible by geological maps and sections and many photographic plates. To the geologist they are of interest from two points of view. Much of the book consists of descriptions of the process of desert erosion, very strikingly exemplified in many of the districts traversed. In the Tarim and Gobi deserts thin sheets of loess, sand, and gravel cover wide areas, and the essential features of desert scenery are exhibited in great perfection. Many fine illustrations are given in this book, showing the effects of sand-sculpture on exposed rock surfaces. There is also a study of the orientation of "dreikanter," and some information on the chemistry of saline desert soils.

More than half of the route traversed was over ground covered by superficial

deposits of this character, and over loose and incoherent Tertiary rocks. In some parts of the desert, however, outcrops of older rocks occur, and in the mountain passes and higher valleys of the Alai and the eastern Kuen Len ranges magnificent sections were exposed to view. The circumstances of the expedition often allowed too little time for a thorough examination, but much has been gleaned that is of lasting value. The mountain axes consist very largely of granite and other intrusive rocks, with gneisses and much altered schists of indeterminable age. They are well seen in the defiles of the Terek-dawan pass, which leads to Kashgar from the north-west, and in the spurs of the Kuen Lun mountains. Upon these rest unconformably sandstones, limestones, tuffs, and other rocks which represent the Devonian (the "Kuen Lun" transgression or unconformability). The Upper Carboniferous strata overlie the older rocks with another unconformability, and are the deposits of a second or "Tibetan" transgression. Mesozoic strata are also in evidence, particularly to the west of Kashgar; they include Jurassic and Cretaceous rocks, sometimes fossiliferous. The gaps in the succession are large, but at least three epochs of disturbance have affected this region. The main strikes, however, are very consistently east and east-north-east. Much of the Gobi desert consists of a plateau built up of the older rocks, with some of the early Tertiary Han-hai or Gobi formation, buried in recent desert sands and gravels.

When completed, this work will be a repository of information on some of the least-known portions of Inner Asia, and a lasting monument to the energy and skill of its author.

J. S. F.

AFRICA.

Innermost Africa.

'From the Niger to the Nile.' By Captain Boyd Alexander, Rifle Brigade. 2 vols. Edward Arnold. 1907. *Price* 36*s*.

This is a very noteworthy book, as is the journey it records. Indeed, from the point of view of geographical discovery, this may turn out to be the last of the great African journeys, or the last but one. There is one more great effort of African exploration, perhaps the most arduous and expensive of all, a journey that is said to be contemplated by an even more distinguished explorer than Captain Boyd Alexander; and this will be to traverse the continent from Swakin through Kordofan, Wadai, Tibesti, Air, Asawad, to Cape Blanco. All the other big or moderately big things have been done, and the great distinction has fallen to the lot of Captain Boyd Alexander and his companions (Claud Alexander, G. B. Gosling, P. A. Talbot, and José Lopes) of completely solving the mystery of Lake Chad. The reviewer, in enumerating those who shared in the work of this remarkable expedition—two of them, Captains G. B. Gosling and Claud Alexander, lost their lives and were buried, the latter in Bornu, and the former on the upper Wele; while Mr. P. A. Talbot returned to England from the banks of Lake Chad—has included the name of José Lopes amongst the "officers," following in this the author of the book. This young man (not quite correctly styled in the book a Portuguese) was a native of the Cape Verde islands, who, in his boyhood, entered the service of Captain Boyd Alexander, and accompanied him on his journeys to the West Coast of Africa. On this last wonderful tour of exploration through the very heart of Africa, José Lopes, according to his employer's account, played such a splendid part in resourcefulness, courage, and adroitness, that he may well be promoted to the commissioned ranks.

The chief point with which this expedition will be associated historically is the survey of Lake Chad. Chad was the first discovered (by Europeans) of all the

great African lakes. More than this, it was probably the first great African lake hinted at in human history. Stories of its existence found their way across the Sahara desert to the Greek and Latin geographers, while from A.D. 900 onwards Arabs brought to the Mediterranean world a definite description of this sheet of water, which seemed all the more wonderful to the white man because of its close juxtaposition with the Sahara desert. The first Europeans to see Lake Chad were Denham and Clapperton in 1823. Overweg, a German in British employ, made a rough survey of it in 1852. Barth and Nachtigal added somewhat to our knowledge of the countries round this sheet of water, but so far as actual survey work went, it was never entitled to more than a dotted outline until this last expedition undertaken by the two Alexanders and their companions, Gosling and Talbot.

Lake Chad was found by them to consist of two or perhaps three completely separate areas of open water, the largest on the north-west, the one next in size on the south-east, while a small irregular patch—almost a series of lakelets—lay between these two separate lakes. The interval between the north-west and south-east water-areas was filled up by a narrow edging of swamp, still more by an extent of reed banks and dried marsh which had almost become solid ground. The southernmost extension of Chad is a great reed-swamp, which is fed by the wide delta of the river Shari.*

A careful and a geographically important land survey was carried out by the expedition from Ibi on the river Benue northwards, eastwards, and again northwards to Kaddai on Lake Chad. But with the departure on other work of Mr. P. A. Talbot, the accurate survey work of the expedition came to an end, and thenceforth there are few additions to our geographical knowledge, except important details here and there as to the courses and navigability of the northern affluents of the Mubangi and of the Yei tributary of the Mountain Nile.

But the whole book in itself is one of the most magnificent additions to geographical knowledge that has been published within recent years. It is difficult to speak of its photographic illustrations without enthusiasm. They are so apposite, so interesting, absolutely unfaked, and exquisitely reproduced. The reviewer is tempted to cover many pages by the interesting deductions to be drawn from these photographs, some of which are even more important in the facts they reveal than has been immediately apparent to Captain Boyd Alexander. Viewed in the light of ethnological information, these photographs are truly remarkable. For the first time we are given clear, exact portraits of certain types of Fula. The reviewer cannot unhesitatingly endorse the opinions expressed as to the origin of the Fula by Mr. Morel (which opinions are adopted by Boyd Alexander); but it is clear that the Fula, though their language connections almost certainly lie with West Africa rather than with East, are obviously a half-and-half type between the Caucasian of the north and the negro of the south. Moreover, they remind one irresistibly (as Lugard pointed out) of the Bahima aristocracy of western Uganda, and these again of the Gala and even of the Egyptians. It is a remarkable fact that the dominant breed of cattle amongst the Fula peoples in West and in Central Africa is almost identical with the Ankole oxen of western Uganda, north Tanganyika, and portions of the Congo Free State, a breed always associated with a Hamitic type of aristocracy, and, of course, also known to us as the commonest breed of cattle in Ancient Egypt (*Bos ægyptiacus*). These cattle, together with the humped zebu type, are admirably illustrated in the work under review.

* *Chad*, *Chadda* (name for the Benue), *Chari*, *Kade*, *Ngali*, *Shari*, *Nzari*, *Nzadi*, *Zaire*, are among the many variants of an old African root-word for big river or lake, which underlies all the modern language families in West Central Africa.

The once mysterious Budduma islanders of Lake Chad are depicted to us by a remarkable series of illustrations, and proved to be very Nilotic in physical type. A good deal of information, photographic and literary, is also given about another very little-known people, the Tubu of the regions north-east of Lake Chad. Bornu and the interesting negroid Arabs of the Lake Chad region are depicted as they have never been before, and so are the Tawareq and their Crusaders' armour. So, too, is much of the big game—Sassaby antelopes (it is not quite correct to call them hartebeests), water-buck, rhinoceroses (this is the first time the rhinoceros has been recorded *scientifically* from West Central Africa), giraffes, lions, hippos, the okapi, chimpanzee, and cheetah; besides the native breed of dogs (particularly interesting), domestic sheep, goats, and the afore-mentioned oxen. The tropical forests of the Mubangi basin, the acacias, papyrus, and reeds of Lake Chad, the lake-like width of the Mubangi river, the ugly monotony of the Shari plains, the park-like country between the Niger and the Benue, and the extraordinary villages of the Murchison mountains (built round great natural monuments of bare rock); all these constitute such a faithful yet diversified picture of the very heart of Africa, its men, beasts, mountains, rivers, lakes, marshes, and towns, as has rarely, if ever, been put before the stay-at-home public by any previous writer.

There are a few trifling errors in the spelling of native names (in the south more particularly), but it would be ungenerous to make any trivial criticisms.

In conclusion, I should like to draw attention to the remarkable exploration of the island of Fernando Pô made by Captain Boyd Alexander several years ago, and to the fact that he noticed a great physical resemblance between the Bube natives of that island and the Munshi tribe of the river Benue. I have recently noted a certain linguistic connection between the Bube and the semi-Bantu tribes to the north-east of the Cross river, which brings us very near to the land of the Michi, or Munshi. It is curious that, although this warlike cannibal tribe has been known to explorers since the late fifties, no traveller has as yet recorded its language. The vocabulary taken down by Koelle in 1851, at Sierra Leone, from a supposed Munshi (Tiwi) slave, shows this language to be semi-Bantu in character.

The letterpress of Captain Boyd Alexander's book is on a par with its illustrations.

H. H. Johnston.

North Africa.

'Stanford's Compendium of Geography and Travel' (new issue). Africa. Vol. 1, North Africa. By A. H. Keane, LL.D., F.R.G.S. *Maps and Illustrations.* Second edition, revised. London: Edward Stanford. 1907. *Price* 15*s. net.*

This edition of Prof. Keane's volume on North Africa in 'Stanford's Compendium of Geography,' is intended for the student who seeks to possess in a convenient form the results of the additions made to geographical knowledge in that part of the world in the last twelve years, together with a summary of recent political and economic developments. The general character and high standard of the work is well known, and the first edition was a worthy contribution to a better understanding of many obscure and difficult problems. This new edition is a revision; the work has not been re-written, and while much has been added to bring the narrative "up-to-date," there are a few points open to criticism. This is especially the case with regard to British West Africa. Thus on p. 247, we read that the Gold Coast "is barred by the humiliating Anglo-French Treaty of August, 1889, from spreading inland beyond the 9th degree of north latitude"—whereas in fact it extends, in virtue of the 1898 Convention, to 11° N. lat. Then no hint is given of the recent gold-mining operations in the Gold Coast and Ashanti, while Kumasi is said (p. 381) to be "a large place with a reputed population of

70,000 to 100,000," whereas the true figure in December, 1906, was 6280, and, even including suburbs, did not exceed 20,000. Again, Lagos is credited with a population of 75,000, which is about 25,000 too many: it might have been pointed out that it is now capital of Southern Nigeria. Six lines are devoted to the work of the Royal Niger Company, and that without a mention of Sir George Goldie. Are not such phrases as "the still almost unknown region which is enclosed by the great northern bend of the Niger" (p. 267) and "Kasala, capital of the rich province of Taka" (p. 618), uncorrected survivals from the first edition? It is, however, an unthankful task to pursue these omissions and misstatements. The new issue retains all the wealth of ethnographic lore contained in the first edition, while the purely geographical pages have been, as a rule, adequately revised. The book is specially valuable as tracing the interrelation between the physical features of a country, the character of its inhabitants, and its economic development.

F. R. C.

AUSTRALASIA AND PACIFIC ISLANDS.

Historical Geography of Australasia.

'A Historical Geography of the British Colonies.' Edited by Sir Charles Lucas. Vol. 6, Australasia in two parts. By J. D. Rogers. Pp. 440, 9 maps. Oxford: 1907. *Price 7s. 6d.*

Into a volume of 440 pages Mr. J. D. Rogers has compressed a most instructive sketch of the political history and a summary of the geography of Australasia, under which term he includes, not only Australia and New Zealand, but most of the islands of the south-western Pacific. The volume is divided into two parts, of which the first (of 308 pages) deals with history, and the second (of 132 pages) with descriptive geography. The limits of space presented the author with the alternative of recounting only a few main events and stages, or of giving short reference to many. He has chosen the latter course, and deals so briefly with each episode that the volume is, for its size, a remarkably complete *précis* of Australian history. The book is saved from the dulness which usually accompanies such compression by its humour, its selection of graphic incidents, and a pithy and picturesque literary style. Thus the author remarks that the settlers of Otago and Christchurch were the only Australasians who were driven to colonization "bent on going to heaven in their own way without interruption" (p. 141), and gives a sarcastic sketch of Dr. Lang and his "indignation at the tardiness with which statesmen gave effect to what he and Providence had predetermined." The work shows on every page evidence of detailed research and reference to first-hand authorities. There are abundant quotations from the Colonial Hansards, and what is of even more value in this case, many references to early British official records, which are less accessible in Australia, where they are of most interest. The richness in reference to little-known official literature is the distinctive feature of this volume, which gives the book an authority and an interest out of all proportion to its size.

The main subject-matter is political history, but the author never writes as a partisan. He reminds us that the Australian wool trade grew from 1819 to 1844 with the help of a preferential tariff from Great Britain; and he adds that the effect of the abolition of this preference "cannot be traced with certainty by statisticians" (p. 90). The author writes with warm sympathy with his subject; he helps to repel the prejudice based on the introduction of the convicts by reference to the official statistics of their crimes; "more than half were criminals of the mildest type" (p. 53), and "many of the convicts of 1788 were not what we should call criminals" (p. 104). He quotes Leslie's statement that the twenty-two convicts

who accompanied him to the Darling Downs were "worth forty men I have since seen." The author obviously thinks the convicts were much better men than some of their gaolers, such as Governor Bligh—"that famous grim sea-captain," whose crew mutinied on the *Bounty*, and whose cleverness in stocking his private farm at the public expense "would have made the unjust steward green with envy" (p. 66). Luckily, Bligh ran a tilt against McArthur, "a man born to shine in many spheres of life, but not at the stake;" and a second mutiny against Bligh relieved Australia of this unscrupulous tyrant. It is a relief to turn from the early naval governors to statesmen like Gipps, who began his career by hanging seven white men who had slain blacks (p. 77), and Grey, who, when General Cameron declared Weraroa was impregnable and demanded two thousand more soldiers, carried it by storm at the head of a few Colonial volunteers (p. 222). Mr. Rogers quotes Grey's noble maxim, "I could neither govern nor conciliate a people with whose languages, manners, customs, religion, and modes of thought I was unacquainted" (p. 139). The author does not seem to know Australia personally, and it is therefore remarkable how successfully he escapes the many pitfalls; there are occasional slips and misprints, such as the "verbetrate" New Guinea, the location of the Broken Hill mines at Silverton (p. 189) (although in part 2 the population of the two places is given correctly, and Silverton thus shown to be a mere hamlet), or the reference to the geysers of Mount Morgan. The statement, "Outrim is the only good coal district in Victoria" will please one company as much as it will be disapproved by the others. The author's view that Burke and Wills "were the first adventurers for adventure's sake in Australian history" is not likely to meet universal acceptance, nor his description of Eyre's great journey as a "mad freak." But it is ungracious to refer to such trifles when the whole historical section is so accurate and so fair.

The geographical section of the work is less satisfactory. The maps are poor and old fashioned; they represent widespread plateaus like mountain chains, and a barely perceptible divide on a broad plain as if it were a great mountain range. The account of the mountain system of New South Wales is interesting from its raciness of description, rather than as an accurate representation of its structure. The author's graphic methods are less suited to physical than to historical geography, and such passages as "the structure, shape, and direction of the great range contain the key which unlocks every geographical secret of Middle island. With the aid of this key, Middle island is read off as easily as Italy or South America" (pt. 2, p. 29), or that "All the gold of the east is quartz-gold, and the best gold is found where greenstone and slate are nearest, just as the best tin is found where granite meets slate" (p. 55), do not show the keen insight or accuracy of the historical part of the work. The author's knowledge of the geographical literature is also less complete than of the historical; acquaintance with Marshall's 'Geography of New Zealand' (1905) would have been useful in the description of New Zealand.

Probably the best chapter dealing with physical geography is that on the aborigines of Australia; the author brings out their Caucasian affinities by reference to their resemblance to the Dravidians of India and the Veddahs of Ceylon, and to the possibility of mistaking them for a "nude, scarred, dyed European." He lays stress on "the great gulf fixed" between the Australians and the black, woolly-haired Tasmanians. The author, however, describes subcision as an "objectless operation," a view in opposition to the expert medical opinion of Prof. Anderson Stuart. The author is to be congratulated on a compact and most useful digest of Australasian history.

J. W. G.

POLAR REGIONS.

Voyage to East Greenland.

'Duc d'Orléans. A travers la Banquise du Spitzberg au Cap Philippe, Mai-Août, 1905.' Paris: Librairie Plon. 1907. Pp. 349. *Maps and Illustrations. Price* 24 *francs.*

In 1905 the Duke of Orleans chartered the *Belgica*, and, with Captain A. de Gerlache in command, sailed for Spitzbergen. The vessel cruised along the western and northern coasts of West Spitzbergen, Dane's island and Treurenberg bay, the site of the Swedish geodetic station, being visited, and then an attempt was made from the north-western angle of Spitzbergen to reach the coast of Greenland, the chief object of the expedition; but the pack proved too solid, and, though a more westerly course was held than on previous voyages, Cape Bismarck was the first land sighted. The season proved to be unsually favourable, and open water lay to the north. A large bay—Orleans bay—was discovered, with an island, named Ile de France, on its eastern side. The duke tried to reach the western shore, but was stopped by lanes of water too wide and deep to cross without a boat. A lofty coast-line was also seen for a considerable distance to the north, and in all the duke claims to have added nearly 2° of latitude to the discovered shores of Greenland. Fuller details will be found in the *Geographical Journal*, vol. **29**, pp. 93. For the rest, the narrative necessarily resembles those of the many polar expeditions which have gone out in recent years. Bears and hooded seals were numerous, and sport was good. The appendices contain the list of soundings and of birds and animals observed, and the book is well illustrated by the artist of the expedition, Mr. E. Mérite, and with photographs. The maps show the course of the whole voyage, the route along the edge of the pack and the newly discovered coast.

GENERAL.

A Pioneer of the Sea-route to Siberia.

'Life and Voyages of Joseph Wiggins, F.R.G.S.' By Henry Johnson. London: Murray. 1907. *Price* 15*s. net.*

It is well that the praiseworthy efforts of Joseph Wiggins should be placed on permanent record. He was an excellent type of a British seaman, honest, knowing his business well, energetic, and persevering.

He was a master mariner, and in 1867 was appointed nautical examiner at Sunderland. While so employed he conceived the idea of establishing commercial intercourse with Siberia by way of the Kara sea. Siberia, he maintained, needed an ocean highway.

This is the old route attempted by Willoughby under the auspices of Edward VI., by Stephen Burrough, who discovered the strait, which ought to bear his name, between Novaya Zemlya and Vaigats island in 1556, by Pet and Jackman in 1580, and by Barents in 1594. All were stopped by the ice because they were too early in the season. But the Russian *lodias* even then made regular voyages along the coast from Archangel to the river Obi. In 1738, Lieut. Malygin was sent by the Russian Government and reached the Obi, and Lieut. Kookalof made a voyage to the Yenisei. Admiral Lutke made surveys in 1821–24; and the coast-lines were delineated by Lieuts. Ivanoff and Ragosia in 1827–28. Later, in 1869, Palliser and Carlsen crossed the Kara sea to the mouth of the Obi, and in 1870 that sea was traversed by a whole fleet of Norwegian walrus-hunters, one of them, Johannesen, passing beyond the mouth of the Yenisei, finding the sea clear of ice late in the season.

All this was well known to us, and there was no question about the navigability

of the Kara sea. It is a shallow gulf, 320 miles long and 160 across. Ice-floes of great thickness are forced against the eastern shores of Novaya Zemlya, but the sea usually becomes navigable late in the season. The water is much colder than that of the Barents sea, and Von Baer called the Kara sea an ice-cellar. So that Captain Wiggins's theory about the Gulf Stream is mistaken.

Captain Wiggins discovered nothing. His merit is that he directed attention to this route to Siberia, and made himself a pilot for it. Siberian merchants, notably Sideroff and Siberiakoff, offered rewards for a successful voyage, and Captain Wiggins succeeded in raising funds to buy and fit out the steamer *Diana* (103 tons) in 1874. He was able to reach the mouth of the Obi, and then returned. But Nordenskiöld reached the Yenisei in 1875, and made an equally successful voyage in the following year.

In 1876, with the help of Mr. Gardiner and of Siberiakoff, Captain Wiggins was enabled to fit out the *Thames*, a steamer of 150 tons, and succeeded in reaching the Yenisei river; but there the *Thames* was wrecked and abandoned. It was in 1878 that Captain Wiggins made his most satisfactory voyage, through the very efficient aid of Mr. Oswald Cattley, a merchant of St. Petersburg. Mr. Cattley chartered the *Warkworth* steamer, and had a cargo of wheat and hemp ready in the Obi river. Captain Wiggins took out the *Warkworth* to the Obi, shipped the cargo, and returned without accident. The *Neptune*, a Hamburg steamer, did the same.

Sir Robert Morier, the English Ambassador at St. Petersburg, took up the cause with some enthusiasm in 1887, and a company was formed, owning the *Phœnix* steamer (270 tons). Captain Wiggins took her up the Yenisei, but there again his vessel was hopelessly stranded. Going home overland, he next went out in the *Labrador*, but returned with the cargo, and the company became bankrupt. From 1890 to 1894 Captain Wiggins was connected with Mr. Popham's ventures, reaching the Yenisei twice, but again losing his vessel.

It was necessary that there should have been complete success attending every voyage if commerce was to be turned into this channel. The only really well-managed venture was that of Mr. Cattley—a man who evidently understood his job. The Russian Government prefers to favour the Moscow merchants by turning all the trade into the railroad. But a time must come when Siberia will be free and the ocean highway by the Kara sea will naturally become a frequented and flourishing route.

After his last voyage to the Kara sea, Captain Wiggins commanded steamers bound to Australia. He finally retired to a house near Harrowgate, whence he volunteered to join the Antarctic search expedition. He died, at the age of seventy-three, on September 13, 1905. Captain Wiggins bequeathed the beautiful plate which had been presented to him by the Emperor of Russia, to the Royal Geographical Society.

In 1894 the Murchison Grant of our Society was presented to Captain Wiggins. The present writer then addressed him as follows: "It was through your resolution, determination, and excellent seamanlike qualities that a new route has been opened for commerce; you are the pilot of the Kara sea, and I understand that you have received a recognition of your services from his Imperial Majesty the Emperor of Russia. I am sure no man ever deserved it better. The Murchison Grant is in a peculiar way fitted for the recognition of your services, for Sir Roderick Murchison took the deepest interest in ice-navigation, as well as in the commercial prosperity of Russia."

This book is interesting and well arranged; but the panegyric is too indiscriminate. No man ever lived who never made any mistakes. There is also a

disposition to disparage the work of others, especially that of Nordenskiöld, who had certainly reached the Yenisei twice before Wiggins had reached it once. Wiggins was an exceedingly fine type of an English sailor, combining patience and forethought with energy and enthusiasm. He had an honesty of purpose and a charm of manner which secured him many friends.

C. R. M.

SHORT NOTICES.

Europe.—'A History of the Parish of St. Mary, Rotherhithe.' By E. J. Beck. (Cambridge: The University Press. 1907. Pp. xvi. and 270. *Maps and Illustrations.*) This detailed study, from original sources, of a district historically one of the most interesting in London, is excellently carried out and beautifully illustrated by means of a variety of appropriate reproductions, from old prints to works of Whistler, as well as by photographs. A chapter by Canon T. G. Bonney, based on the geological history of the district, form a fitting geographical preface.

'The Spanish Series.' By A. F. Calvert. (London: John Lane. 1907.) Three volumes of this series are here to be noticed—'Toledo' (pp. xxiii., 169, and 511 plates); 'Granada and the Alahambra' (new edition, pp. xxxvi., 88, and 460 plates); 'Cordova' (in which Mr. Calvert's collaborator is Walter M. Gallichan, pp. xvi., 108, and 159 plates). As will be gathered from the above enumeration, the remarkable feature of these volumes is the number of illustrations. Considering their low price, these are very excellent. They provide an abundance of detail in architecture, paintings, and other objects of art, and though there are certain technical faults in some of the architectural photographs, not entirely, perhaps, to be accounted for by the difficulty of the subjects, criticism is silenced by the care shown in their selection. One plate in each volume is a sketch-map of the town treated.

Asia.—'From Tokio through Manchuria with the Japanese.' By Louis L. Seaman. (New York: Appleton. 1905. Pp. xv., 268. *Illustrations.*) This is an entertaining narrative of the author's experiences and observations during the Russo-Japanese war, when he had special facilities for following affairs.

'The Real Triumph of Japan.' By Louis L. Seaman. (New York: Appleton. 1907. Pp. 292. *Illustrations.*) Here the same author deals with the particular subject in which he was primarily interested in connection with the Japanese operations, namely, their hospital and general medical organization, of which he is loud in praise.

'The Sea-Dyaks of Borneo.' By the Rev. E. H. Gomes. (London: Society for the Propagation of the Gospel in Foreign Parts. 1907. Pp. 75. *Maps and Illustrations.*) This little book provides a simple and clear account of an interesting people, not including much scientific ethnographical detail, but going deeply into the customs and mode of life of the Sea-Dyaks, and narrating the progress of missionary work among them. There are several excellent illustrations.

America.—'A travers l'Amérique du Sud.' By J. Delebecque. (Deuxième edition. Paris: Plon-Mourrit et Cie. 1907. Pp. viii. and 318. *Maps and Illustrations.*) The journey here described, includes coasting from La Guayra, in Venezuela, to Lima in Peru (crossing the isthmus of Panama), with a *détour* into Ecuador, and finally the crossing of the continent by way of the Amazon. The time occupied in the crossing from Lima to Peru was sixty-four days. The story is told vividly, and with no little humour.

THE GEOGRAPHICAL ASSOCIATION.

The Annual Meeting of the Geographical Association was held at University College, London, on Wednesday, January 8, 1908. The President, Mr. Douglas W. Freshfield, was in the chair. The hon. secretary, Mr. A. J. Herbertson, summarized the annual report. He pointed out the rapid growth of the Association, the membership of which had risen to 643, of whom fifty-six were colonial or foreign members. Three new branches had been opened in Sheffield, Bristol, and North London. The new edition of the 'Hints to Teachers,' originally prepared by Dr. Mill at the request of the Association, was in the Press, and would be issued with the title 'Guide to Geographical Books and Appliances' at Easter, by Messrs. G. Philip & Son. Dr. Mill had generously presented the Association with all his rights in the work. A special committee on lantern slides was preparing special sets illustrative of different regions and of different aspects of geography. Members would receive considerable discount on the prices of these slides, and could hire them for long periods at specially low rates. The committee had resolved to form a small lending library for the special benefit of country members. He asked for contributions to the lantern slides and library. The committee had arranged a course of six evening lectures on the Teaching of Geography, which would be given in the Lent term of 1908, at University College, London. The growing correspondence necessitated the appointment of new correspondents on different subjects. The reports of the branches showed that they were doing good work and proving of much local benefit. Special thanks had to be given to Mr. S. Vaughan Morgan for a donation of £10 to the general funds of the Association, and £5 5s. to the library funds. Donations in money, and presents of views and books, would be specially welcomed by the Association. Attention was called to the new regulations and syllabuses for training colleges and the certificate examinations, to the recognition of geography as a subject for the final pass B.A. at Oxford, and to the inclusion of geography, with 600 marks attached to it, among the subjects for the Higher Civil Service examinations.

The hon. treasurer, Mr. E. F. Elton, of Wellington College, then gave a statement of accounts. Both this and the annual report were adopted, and the office-bearers were elected for 1908.

Mr. Dougles W. Freshfield, who was re-elected President, then gave the presidential address. He said that last year he had had to comment on the exclusion of geography from the examinations for the higher branches of the Civil Service, including the Foreign Office. They could now congratulate themselves upon its inclusion. The struggle was a somewhat arduous one, and the President of the Royal Geographical Society (Sir G. Goldie) had spared no pains to bring it to a successful conclusion. They owed much to the support of the Universities; Oxford in particular. Members of the Foreign Office henceforth would not be called upon to pick up their geography, after they have joined it, at the expense of the interests of the nation. The minds of all engaged in secondary education had been lately agitated by the controversy with respect to the teaching of Greek in public schools and Universities. It affected teachers of geography inasmuch as some of those who desired to retain Greek in its old predominant position, would do so by throwing over wholly or in part such modern studies as history and geography; while, on the other hand, some of the modern extremists were led into revolutionary proposals which would injure the cultivation of a reasonable system in our public schools. There had lately been an interchange of articles in the *National Review* which might be cited in illustration of the present state of men's minds. That most popular author, lately a house master at Eton, Mr. Arthur Benson, alleged that classic

authors such as Cæsar are studied far too laboriously and unintelligently—mainly as exercises in grammar—and he made the startling suggestion that a few hours every day might be spent with advantage by schoolboys in hearing the daily paper read and commented on. Canon Lyttelton, head master of Eton, retorted that "practical effectiveness" was missing in Mr. Benson's criticism, that he had no scheme of education to put forward, and compared that criticism to the plaintive, inarticulate note of the curlew. But Canon Lyttelton went on to compare himself and his brother head masters to perplexed travellers on a misty moorland. Was not this an interesting confession from the first of head masters, and a suggestive one in the present crisis? In the light of this confession he glanced at the recent debates at the Head Masters' Conference at Oxford, with the suggestion of the head masters of Winchestor and Eton, that little boys at private schools should be soundly grounded in modern subjects in place of being crammed with Greek. Most of them would probably agree with this; but the boon was to be bought at a price. Canon Lyttelton was understood at the time to say that he proposed, in order to make more time for Greek, to exclude history and geography altogether from the teaching of boys between 12 and 18. He had, however, explained that he only meant to suggest as a detail that, in order to give time for a full study of Greek, modern studies should be neglected for two years. While the first supposed proposal was monstrous, the second was insidious and dangerous. He regarded the problem from the point of view of one who would deeply regret the exclusion of Greek, yet who could sympathize with the despair raised in masters' minds by the multiplication of subjects, the absurdity of parents, and the diversity in intelligence of boys. Let classics be taught as modern languages were taught, and history and geography need not be excluded for two years; there would be plenty of time for keeping them up. If they were not kept up, the classics could not be taught properly. How could a book be read intelligently if the conditions, human and physical, in which the author moved were not explained? What confusions had not learned commentators and eminent editors fallen into from an incapacity to handle geographical and topographical facts? If geography and history were dropped even for two years, the geographical and historical aspects of classical teaching would be dropped, and the root of the subject would not be reached. Get rid of the tradition that the only intellectual grindstone for boys was to be found in the grammatical complexities of dead languages. Believe that languages could be taught with profit without aiming at the perfection of qualifying your pupils to write them with correct fluency in intricate metre. There was no need for permanent antagonism between the classicists and the moderns; the two "sides" could be combined and welded by those who would take a broad view, unhampered by traditions, party spirit; who would avoid the falsehood of extremes and the extravagances of cranks. Let them look abroad and see how other nations managed their education. Let them not be discouraged by the temporary bewilderment and divagations of their leaders. The latter would realize in time that while they had been meandering in mist the straight path was only a few yards off, and that other guideless parties had already found it.

Major C. F. Close delivered a lecture on "Map Projection" with lantern illustrations, and Mr. B. B. Dickinson, of Rugby, exhibited on the screen and described views of the Rhine gorge, specially prepared for members of the Association. A fuller report will be found in the *Geographical Teacher* for February.

THE MONTHLY RECORD.

EUROPE.

Glacial Lakes and River-gorges in England.—In the well-known case of the Yorkshire Derwent, it has been generally accepted by geologists that the gorge south of Malton was cut by the overflow of a lake which occupied the Vale of Pickering during the glacial epoch, such overflow being due to the blocking by ice of the natural outlet to the east. That a precisely similar state of things may have given rise to the formation of gorges in other parts of England is suggested by Mr. F. W. Harmer in a paper read before the Geological Society in May, 1907, and printed in the *Quarterly Journal* of that body for November. The writer avowedly dealt largely with hypothesis, and his views will not be accepted in their entirety without further evidence, but they are at least worthy of consideration as supplying an alternative explanation of the origin of some of the English river systems as at present existing. Mr. Harmer starts with the statement that the gorge-like valleys of Yorkshire, of which the glacial origin has been established, must be typical rather than anomalous, and that where we see similar recent-looking gorges cut down to base-level across ridges of high land, a similar origin is suggested, while he holds that the conditions in Central England in glacial times were precisely those under which glacial lakes would naturally have originated. The principal cases put forward are as follows: (1) The gorge of the Severn at Ironbridge, with a supposed lake occupying the southern part of the Cheshire plain; (2) the gorges at Stratford-on-Avon and Clifton, with a lake in the Trowbridge area; (3) the gaps in the Jurassic escarpment at Lincoln and Ancaster; (4) the Goring gap in the Thames valley, with a lake occupying the great Oxford plain. Mr. Harmer supports his view, particularly in the two last cases, by a careful survey of the distribution of glacial deposits in Central England, which he shows to be such as to point in the desired direction. In the case of the Severn his explanation certainly seems probable, and it harmonizes with the views held for some time by Prof. Lapworth. But he, perhaps, makes too much of the supposed similar origin of similar phenomena, which, if carried to extremes, would involve a glacial origin for all gorges draining wide basins across ridges of high ground, which can probably be explained, in many cases, by the differential denudation of the harder and softer formations. He also lays stress on the recent character of the gorges and the absence of indications of former river-courses, of which they might have formed part; though, considering the amount of possible subsequent denudation, such traces might hardly be expected to exist now. Another point insisted on is the fact that the gorges are cut down to the level of the plains on either side, though the precise bearing of this on the problem is not clearly explained. To account for the lowering of the plains above the gorges, Mr. Harmer resorts to what he terms "lacustrine denudation," which he supposes to have acted *pari passu* with the wearing down of the gorges. But he goes into no details as to its manner of action, and it could hardly, in any case, be as efficient as ordinary river erosion. His strongest point seems to be the very recent character of the gorges, and, in the case of the Goring gap, the presence in its immediate vicinity of high-level gravels regarded by competent observers as of Glacial age. The argument from the probability that the original drainage was longitudinal, following the strike of the Triassic and softer Jurassic rocks, also deserves consideration, though any attempt to define the conditions at so remote a period must involve a large element of uncertainty. In none of the cases spoken of is the direction of the former drainage so unequivocal as in that of the Vale of Pickering.

ASIA.

Dr. Sven Hedin.—A communication from Dr. Hedin, received at the Society, confirms the statements lately made in the daily press that the explorer claims to have located the ultimate sources of the Brahmaputra, Sutlej and Indus. That of the Brahmaputra (evidently the Kub of the previous communication : *Journal*, vol. 30, p. 560) is said to lie on the northern side of the northernmost parallel range of the Himalayas. On November 8 Dr. Hedin was about to start for Ladákh and Khotan.

Ascent of Mount Halcon, Mindoro.—This, the third highest summit in the Philippines, was ascended for the first time at the end of 1906 by an American party headed by Major E. A. Mearns, U.S. Army, and including among its members Mr. E. D. Merrill, who describes the expedition in the third number of the *Philippine Journal of Science* for 1907. The interior of Mindoro has remained the least known portion of the Philippine archipelago, its rough and forest-clad character presenting unusual difficulties to the explorer. The English naturalist, Mr. John Whitehead, reached an altitude of 6000 feet on the Mount Halcon range in 1895, while unsuccessful attempts to reach the summit were made by American parties in 1904 and in June, 1906. The difficulties are increased by the exceptionally heavy rainfall and the great body of water carried by the rivers when in flood. Dr. Mearns' expedition struck inland from Subaan, on the north coast to the west of Calapan, the capital of Mindoro, going south-west to the Alag river, an upper branch of the Bako, and ascending this to the vicinity of the mountain. Most of the route led over steep forest-clad ridges, between which the Alag and its tributaries flowed in deep cañons. Native trails were sometimes made use of, but a path had often to be cut through dense bush. On reaching an altitude of 4500 feet the travellers entered a region of constant fog and rain, and suffered severely from the constant wettings and the cold, the temperature being constantly below 60° Fahr. After attaining the main ridge at an altitude of 7800 feet, the bush gave way for a time to open heath lands, but these were limited in extent, and before gaining the summit the thickets became denser than ever (though more stunted), and the cutting of a path was excessively laborious. No indication was seen that man had ever penetrated to the summit region. The commissariat was naturally a matter of difficulty, especially as the advance party was more than once cut off from the base camp by flooded rivers, but in spite of all obstacles the return journey was at last successfully accomplished. Like other travellers, the expedition found leeches exceedingly troublesome at lower levels, but brown soap smeared on the legs of the native carriers was found to be a good repellent, and puttees proved effectual in the case of the whites. The interior of Mindoro is inhabited only by the aboriginal Mangyans, who are little known to the outside world. Their houses and clearings were frequently met with, but only three individuals were seen, as they take to flight on the approach of strangers. One of their houses was unusually large and well built. The presence of Mount Halcon (a Spanish name signifying "falcon," the natives apparently knowing the mountain either as Alag or Bako) causes an enormous precipitation in the north of Mindoro, extending continuously over nine months in the year, while the remaining three, February, March, and April, are not always dry. The vegetation bears evidence of the exceptional humidity in the abundance of epiphytes, ferns, orchids, mosses, etc., which at the higher elevations clothe the branches so densely as to completely conceal them. Halcon (which probably has an altitude of 8500 feet) is not due to volcanic action, but the range, which is formed of granite, white quartz, schist, and marble, seems to be a fold. Mindoro as a whole seems to differ from the rest of the group, of which it is possibly the oldest portion. There are indications of an early connection with some great mass to the west and south, followed by a prolonged separation.

AFRICA.

The Egyptian Survey Department.—The report of Captain Lyons for 1906 records the usual amount of valuable work in the various branches of this department, which has to do not only with survey pure and simple, but with meteorological and geological research, observations of the Nile discharge, and other matters. The two principal features of the survey work were the completion of the Cadastral Survey (on which a special report is promised), and the publication of about one-quarter of the general map of the Nile valley and delta on the scale of 1 : 50,000. Another piece of work was the demarcation of the Turco-Egyptian frontier (*Journal*, vol. **30**, p. 89), which will also be dealt with in a special publication. As regards second-order triangulation, a complete chain of which (as shown in a sketch-map accompanying the report) exists from the Mediterranean to Wadi Halfa, attention was chiefly directed during the year to the delta, a great part of which had not been satisfactorily triangulated before. Base-measurements at Alexandria and Waked with the Jäderin apparatus gave remarkably accurate results. Various lines of precise levelling were also completed in the delta. A great part of the work of the topographical section was done in the Nile valley between Khartum and Wadi Halfa, in connection with possible sites of reservoirs (*Journal*, vol. **29**, p. 332). Great care was taken to ensure accurate results, and the levelling gave interesting results as regards the varying slope of the river. An important statement is made regarding the longitude of stations in the Sudan, as adopted in Colonel Talbot's survey. This officer used the value 31° 17′ 13″·5 east of Greenwich for the west transit room of Abassia observatory, which has since been found to be 4″·96 too great. But the direction given in 1902 in the War Office list of latitudes and longtitudes, that 5″ must be subtracted from Colonel Talbot's longitudes, does not after all hold good, for the Nile valley triangulation has shown that the longitude of Colonel Talbot's point at Wadi Halfa, as determined telegraphically some years ago, is too small by 4″·07. The two corrections thus, curiously enough, nearly neutralize each other, the ultimate correction being only 0″·89. The most important work of the Geological Survey was that in the eastern desert between 22° and 26° N., carried out by Dr. J. Ball, Mr. Villiers Stuart, and others. This is the subject of a memoir, which will be referred to elsewhere.

The East African Rift-system.—Dr. Carl Uhlig, whose researches in East Africa have been frequently referred to in the *Journal*, has summed up the results of his observations regarding the East African rift-valley and associated fault-scarps, in the *Geographische Zeitschrift* for September, 1907. The portion of the system examined by Dr. Uhlig and his associates was that comprised between 2° and 4° south, and extending from a little north of the Magad or Natron lake to a little south of the Laua ya Mueri : and the morphological features of this section are described in full detail by the writer, who also discusses the many problems still unsolved with regard to the geological history. He brings out clearly the complex character of the series of scarps and depressions, and shows the need for further research before the problems alluded to can be regarded as solved. Although all the main features are of tectonic origin, there is great diversity in their age and present form in different parts of the area. In places the scarps are well marked and follow a regular direction, while at others they are so irregular that it is difficult to say what is their precise direction or whether they are to be traced at all; and while frequently formed of recent volcanic materials, they occasionally consist of Archæan rocks. The volcanoes, too, seem to be of very various ages. It is to the north of the area in question that the rift-valley bears the well-marked character known to visitors to British

East Africa, and described by Prof. Gregory in his well-known book. But while the western scarp continues its regular course between 2° and 4°, that on the east loses its continuity and even seems to disappear altogether. So that Prof. Uhlig hesitates to recognize a "rift-valley" at all in this section, but speaks of the western line of heights as the "East African fault-scarp." Even on this side the ground rises in somewhat irregular steps, and the main scarp itself varies greatly in height, though it shows throughout the characters of extreme youth, its high cliffs being bordered in places by a talus of 100 feet only. West of it, and running considerably to the west of south, is a second escarpment, in which the primitive rock comes to light. It is due equally to tectonic agencies, but is of greater age, its forms showing much greater maturity. To this Dr. Uhlig gives the name "Songo scarp," from the district which it bounds to the east. In the latitude of the north end of the Magad is the volcano Sambu, which gives a wide prospect over the surrounding country, and is likewise older than the main scarp, as half of it has been carried down beneath the surface of the Magad. The main scarp is the most recent of all the similar features, for besides the Songo scarp and Sambu, the Nyarasa scarp and the "Winter" highland (so named from the Winter fund by which the expedition was supported) have also been broken through by it. The Engai volcano is, however, still more recent, being the youngest of all the volcanoes. Much in the geological history of the region still rests, however, on pure hypothesis. Dr. Uhlig regards it as very doubtful whether any connection can be traced between the rifts of this part of East Africa and that of Nyasa in the south.

The Forest of Mount Kenia.—A Colonial Office Report (Miscellaneous, No. 41) gives an interesting expert account by Mr. D. E. Hutchins, of the Kenia forest, which measures 287 miles long by 8 broad, and comprises one million acres of timber, forming a girdle between the heights of 6000 and 9000 feet round the slopes of the mountain. It is the tropical continuation of the forest found at sea-level on the south coast of Cape Colony, at 3000 feet above the sea in Natal, and at between 4000 and 6000 feet in the Transvaal. In its advance to the equator, the forest increases in number of species, a disadvantage in the Kenia forest more than compensated by its possession of cedar in the drier and Ibean camphor in the wetter region. Rubber was not found by Mr. Hutchins in paying quantity in the southern half of the forest inspected by him. The best portion of this, on the south-east slopes, was dense, with lofty trees, clear of undergrowth, and having a soil carpeted with dead leaves and humus. In the lower forest there are more but shorter trees. In the upper the trees suffer from wet, and the number of species declines at the higher levels. At 8500 feet timber practically yields the ground to bamboo, which thence ranges up to the base of the cliffs and rocks of the snowy peak. The western forest is drier; cedar, of easy natural regeneration, is the chief species; bamboo abounds, but only in patches. From his own observation and from report, Mr. Hutchins estimates the timber in the Kenia forest to average, roughly, 2300 cubic feet per acre. On the basis of an average value of 2½*d.* per cubic foot, the value of the timber would be therefore £23 per acre, or in all £23,000,000, the interest of which would exceed by £100,000 the total expenditure of the East African Protectorate. The bamboo forest, over and above the timber, is estimated at 600,000 acres, but, in view of the more accessible bamboo elsewhere, is of little present importance. The rainfall is estimated at 80 to 120 inches on the south, and at 50 to 90 inches on the west side. On the latter, which is drier, forest fires have done incalculable mischief. A daily cloud gathers all over the Kenia slopes. During his stay in December and January, 1906–7, the climate was one of the most pleasant Mr. Hutchins ever experienced. Fevers are unknown, nor did he see or feel a mosquito. The report includes a

discussion of the question of a railway to Kenia, floating timber down the Tana, and the conditions for working the forest.

Northern Nigeria.—The annual report on this Protectorate for 1906–7, presented to Parliament in December last, is drawn up by Sir W. Wallace, who took over the temporary administration during a part of the interval between the departure of Sir F. Lugard and the arrival of his successor, Sir Percy Girouard. The year under review had been generally peaceful, the military operations having, apart from those against the troublesome Marghis in Bornu, been on quite a small scale. Apart from the Bassa province and certain pagan zones in the south, Mr. Wallace was able to report travel through the Protectorate to be absolutely safe. The special reports of the various residents tell a nearly uniform tale of progress, though in one or two provinces changes in the administrative *personnel* have been a drawback. From Bornu Mr. Hewby reports the Marghi and other tribes of the south and north-west as at last in hand. The Shehu (native ruler) is said to be probably the most loyal and one of the best emirs in the Protectorate. It had been decided to move the capital from Kuka to Maiduguri. Appended to Mr. Hewby's report is a short description of Lake Chad by Mr. Hanns Vischer, in which it is stated that the Bahr-el-Gazal to the east, with its continuation to the Bodele and Egei country, lies lower than the lake, and may be regarded as the outlet of its lagoons. This statement is hardly in agreement with the results of recent French research, for it was found by Captain Mangin (*Journal*, vol. 29, p. 569) that the underground flow is certainly towards the lake. In the Yola province, one of the outlying regions where trouble has sometimes been experienced, the attitude of the Fulani is said to be all that could be desired. There has been an influx of population from German territory, this movement being in the opposite direction to that in the previous year. Famine still continues to decimate some of the pagan tribes. Mr. Wallace has made further efforts to arrive at a more accurate estimate of the total population of the Protectorate, with the result that the number is now given as only a little over 7,000,000, of which total 2,714,000 falls to Kano province, and 920,000 to Bauchi. Reference is made to the recent decision to build a railway (ultimately, we believe, to be connected with the Southern Nigeria railway from Lagos), from Baro on the navigable Niger to Zaria and Kano, and it is thought that this will have an important influence on the development of the Protectorate. The steam flotilla numbered twelve vessels, including one twin-screw and ten stern-wheelers. A steel boat has been placed on the Yo, and a boat was also building for Lake Chad. Telegraph construction is still being pushed actively forward, 457 miles having been erected during the year, though more remains to be done. Work has been continued in connection with the mineral survey, and smelting has been commenced in the important tin-field in Bauchi, from which much is expected. Real progress seems to have been made as regards the introduction of cotton cultivation, and between February and December, 1906, 1847 bales, weighing 159 tons, had been ginned and shipped from Lokoja. An appendix treats of the present position of the Senussi movement, and though opinions seem to differ as to the danger to be apprehended from this, the general impression seems to be that British territory at least has little to fear in the near future. It is mentioned that a considerable exodus of nominal Mecca pilgrims has taken place both from the French Niger and from Bornu. The majority are said to be settling in the Nile valley.

Another Crossing of the Sahara.—Mr. Félix Dubois, well known for his work on Timbuktu, who went out early last year on behalf of the *Comité de l'Afrique Française* to make a general study of recent French work in the Sahara, has successfully crossed the desert to the Niger, which he reached about the beginning of December. He reports a state of complete security to prevail in the region traversed.

The Southern Territories of Algeria.—By a decree of April 10, 1907, some modification was introduced into the administrative division of the Algerian Sahara. To the former "territories" of Ain-Sefra, Ghardaia, and Tuggurt (depending respectively on the three older provinces) has been added that of "The Oases," with In Salah as capital. The surveillance of the Morocco frontier and of the Tuareg will thus fall in future to two distinct functionaries. The population of the whole area was estimated in 1906 as somewhat over 446,000. Sketch-maps illustrating the new arrangement are given in *A Travers le Monde* for November 2, and in the *Revue Francaise* for December, 1907.

AMERICA.

Who gave the Name to Labrador?—Dom Ernesto do Canto, in his pamphlet 'Quem den o nome ao Labrador?' has given the most plausible explanation that has yet appeared. There was a certain João Fernandez settled on the island of Terceira, to whom King Manoel of Portugal gave a concession for the discovery of new lands in 1499. In other documents he is called João Fernandez *Labrador*. In those days *Labrador* did not necessarily mean a common labourer, but also a farmer or any one cultivating land. On March 19, 1501, Henry VII. granted letters patent to three Bristol merchants named Ward, Ashurst, and Thomas, with whom were associated three natives of the Azores, one of them being João Fernandez Labrador, to discover new lands. That they did discover new land is proved by Henry VII. having granted them a reward for having done so. Senhor Ernesto do Canto suggests that it was named Labrador by the Bristol merchants, after their colleague, João Fernandez Labrador.

The Huichol Indians of Mexico.—Following up his account of the Cora Indians, Herr K. Th. Preuss has communicated to *Globus* (vol. 92, Nos. 10 and 11) a report of his nine months' excursion, ending March, 1907, in the land of the Huichols in the Mexican Sierra Madre. The Cora to the north are divided from the Huichol Indians to the south by the Rio de Jesus Maria. Between the two, however, are some villages of the "vecinos," or Spanish-speaking Mexicans. The Huichol land, again, is divided in the middle from north to south by the Chapalagana river, which, next turning west, empties into the Rio Jesus Maria, three days' journey above its junction with the Rio Grande. Politically in the state of Jalisco, the Huichol land is religiously administered by two vicars of the Josefinos Order in Zacatecas—one stationed at San Andres, the other at San Sebastian. Dealing principally with their religious notions and customs, the report yields a vivid insight into the naïve character of the Huichols. Knowing how to win their confidence, the author, on leaving, took away some sixteen hundred different objects illustrative of Huichol psychology. There are incidental notices of landscape. On a seven hours' ride over the mountain chain running north and south between San Isidro and Santa Gertrudis, not a ranch offered itself to view, not a human being, no corn-lands, everywhere only broad-leaved oak and tall pine. At the end Dr. Preuss lighted upon a twenty-hut ranch, Tierras Blancas, in the populous valley of Guastifa, the richest district of Huichol land. Here the festival of the roasting of the young corn-cobs was in full swing, following the festival of pumpkins and the cooking of the young cobs. Among other Huichol centres visited were Las Guasimas, Santa Gertrudis, Guadalupe Ocofan, San Andres, and Santa Catarina. The author had the fortune to find all these holding high festival, and was thus able to obtain a rich booty of songs and myths. The Huichol villages are properly occupied only during the festivals. The narrative brings out forcibly the way in which the Huichols have re-cast the institutions of the Christian Church after the pattern of their paganism, which still flourishes in its pristine vigour.

The Distribution of Population in South America.—A paper by Prof.

Mark Jefferson, reprinted from the *Bulletin* of the Geographical Society of Philadelphia, July, 1907, deals with the distribution of population in South America and the geographical factors influencing that distribution, the statistics being taken chiefly from the 'Statesman's Year Book.' The text is illustrated by maps and diagrams. The determining factor in the case of South America is not the rivers, though it boasts two of the greatest river systems of the world, but the mountains. The great bulk of the land lies within the tropics, and it is by the mountains that the dominant population climb to more temperate climates. The dense population of the north-west, including twenty-four cities of more than 5000 inhabitants each, lies along the high Andean valley at heights of 5000 to 13,000 feet. The dense population of Brazil (more than 26 to a square mile) equally clings to the high eastern border. The Amazonian Hinterland is abandoned to the aboriginal savages. The moderate peopling (8 to 26 per square mile) along the west and east coasts down to the southern tropic likewise holds to the mountains. A second factor of population is the coasts. The patches of dense population all lie within 400 miles of the sea. South of the tropics the Andes separate men no less than river-systems, dividing Chile and the Argentine, and not lying essentially in either. Towards the 40th parallel the population abruptly thins away, the blank being relieved only by the town of Punta Arenas. The plains of Chile and Argentina, enjoying a distinctive summer and winter, are the homes of thriving communities. Buenos Ayres with a million, and Rio de Janeiro with 700,000 inhabitants, are the two largest cities. It is notable how the smaller the provinces the more populous are they. The dense shade of population in the Andean republics follows the line of smallest subdivisions. The Amazonian provinces, on the other hand, are of the size of European kingdoms.

The Height of Aconcagua.—Although several attempts have been made to determine the height of the peak of Aconcagua, the culminating point of the Andes, since Admiral Fitzroy's observations in 1835, as is generally the case until an exact triangulation has been undertaken, the results have been most contradictory. In 1904 M. Fr. Schrader, the well-known French geographer, took advantage of an opportunity afforded him, when he had occasion to visit the region, to attempt a final settlement of this long-disputed question. The account of his method of measurement, with the final results, has only recently appeared (*Comptes Rendus Acad. Sciences Paris*, 29 Juillet, 1907), as he hoped to be able to visit the region a second time, but in this he has been disappointed. Owing to the impossibility of obtaining a suitable base by actual measurement at a known altitude from the ends of which the summit was visible, M. Schrader determined to follow the method suggested by Colonel Goulier, and obtain a base by tacheometric measurement on the side of the mountain which was likely to be most reliable under the circumstances, and from the ends of this base take vertical and horizontal angles, from which the height could be computed to the summit of the peak. The levels of the Trans-Andine railway furnished a ready and reliable means of obtaining the height of the base, and as the observations were repeated and checked by various methods, the mean resulting height should not be far from the truth, and is probably the most accurate determination made up to the present date. The length of the base AB was 780·58 metres (2561 feet), and the height of the peak above sea-level, as obtained from vertical angles taken at A, was 6959·9 metres (22,832·07 feet), while from the other end, B, it was 6946 metres (22,789·19 feet). The mean of these two gives a final height of 6953 metres (22,812·1 feet), which result is only 56 feet lower than the height given by P. Güssfeldt, whose determination also depends upon vertical angles. At the commencement of his paper, M. Schrader alludes briefly to previous determinations

of the height of Aconcagua, commencing with Admiral Fitzroy, who surveyed the coast of this part of South America in 1835, but for some reason he entirely ignores the measurements of Mr. Lightbody, of Mr. E. A. Fitzgerald's expedition, 1896–97, which were described in the *Geographical Journal* for November, 1898, and the mean of which gives 23,080 feet for the height of the peak. Mr. Lightbody is an experienced surveyor, and, like M. Schrader, wisely decided to attempt some system of triangulation in preference to the more unreliable hypsometrical determinations. Starting from Punta de la Vacas on the railway, which is fixed by levelling, he ran a theodolite traverse, with distances obtained by bar-subtense method, up the Horcones valley, vertical angles being taken to the summit of Aconcagua from different points on the traverse. As a good 6-inch theodolite was used for the measurement of the angles, the resulting height from the mean of the observations should not be far wrong, provided, of course, that the traverse was properly carried out, which seems to have been the case. It may also be pointed out that M. Schrader states that Admiral Fitzroy makes the height of Aconcagua to be 7300 metres (23,950·6 feet); but this appears to be a mistake, as 23,200 feet is the height given on the Admiralty chart drawn from this surveyor's observations in 1835, and the same figures are given in his paper in the *Proc. of the R.G.S.* for 1837, p. 143 (see also *Proc. of the R.G.S.*, vol. **19**, p. lxxxvii). Admiral Beechey, who measured the height of this peak somewhat later, made it about 100 feet higher.

AUSTRALASIA AND PACIFIC ISLANDS.

The Murrumbidgee Water Conservation and Irrigation Schemes, recently sanctioned by the Australian Parliament, are the subject of a paper lately read by Dr. J. P. Thomson before the R.G.S. of Australasia, Queensland branch. The total length of the Murrumbidgee, from its source at the base of Peppercorn hill, 5000 feet above sea-level, to its union with the Murray at Balranald, is 1350 miles. From its source to Cooma bend, 170 miles, it has an average fall of 11 feet per mile. Thence to the Yass junction its average fall is 4 feet per mile. From Yass junction the Murrumbidgee, striking westerly, flows through the Riverina district, and is joined, below Hay, by the Lachlan, and, further down, unites with the Murray river. From Yass junction to Narrandera it has an average fall of 2 feet per mile. Thence to Murray junction, 470 miles, its average fall is 9 inches per mile. The Upper Region, or Barren Jack catchment, comprising the catchments of the river and its tributaries down to the junction of the Goodradigbee creek, has an area of 5000 square miles. The Middle Region includes the catchment area from Yass junction to Narrandera; the Lower Region, thence to Murray junction. The Upper Region, in which the great dam for the conservation of its waters is to be built, has the advantage of impermeable strata, an excellent climate, abundant rainfall, and is one of the best catchment areas in the state. Its rain-supply is supplemented by the periodic snowfall. The dam, to be erected at Barren Jack, 3 miles below the junction of the Murrumbidgee and Goodradigbee, is to be 200 feet high, and will have a reservoir capacity of 33,380,864,000 cubic feet, and a water area of no less than 20 square miles—an impounded area more than one and a half times that of a Sydney harbour, and a storage capacity little short of that of the Assuan barrage. The work, to be carried on without break from start to finish, is estimated to cost £810,000. Irrigation works are to be constructed in the Lower Region, which, with unusually high thermometer readings, has less than 20 inches rainfall. Between Narrandera and Hay are two large irrigable areas on either side the river. The Government Irrigation proposals are for the present, however, restricted to 358,000 acres (196,000 acres of which are first-class land). To divert the waters from the main channel to the service canals, a weir and regulator are to be

constructed at a granite bar near Bandigerry creek junction. From the offtake here the supply has to flow 132 miles—a course in which the minimization of loss by evaporation, soakage, etc., will be a problem of no little difficulty. Including weir and regulators, the estimated cost for service canals is £764,008, bringing up the total cost of the scheme to £1,574,008. The question of the irrigation of Australia, the paper points out, involves issues of immense economic importance. As a preliminary to all other operations, however, the writer urges the propriety of systematically gauging the rivers, exploring their basins, taking stock of their catchment areas, estimating the resources of ground water available, determining the amount of evaporation in each case, and locating suitable dam sites. The tank system of estimating evaporations, *e.g.*, is criticized as obviously inadequate, and the official estimates of the volume of water passing Narrandera as far from conclusive. It is shown that, whereas in Italy, India, and America the sources of supply are practically inexhaustible, the coast rivers of Australia are short and rapid, while its inland streams carry very little water except in times of flood, nor in general are their channels suitable for large reservoirs.

POLAR REGIONS.

Captain Bénard's Arctic Expedition.—It has been known for some time that the French oceanographer, Captain Bénard, was organizing a scientific expedition to the Arctic seas, the idea of which first took definite shape at the time of the International Oceanographical Exhibition at Marseilles in 1905. An interview with the leader, reported in *Le Journal* for December 12 last, gives some details as to the progress of the preparations, which have so far advanced as to justify the hope that the expedition may be ready to sail in March of this year. A special vessel has been built, of the kind known to sailors as a ketch, strength being made an object throughout. It has been named the *Jaques Cartier*. M. Pénard has no intention of trying to make a record as regards latitude, but his object is to obtain accurate scientific observations from a little-known part of the Arctic region —the coasts of Novaya Zemlya, the Matochkin Shar, and the Kara sea. Work in the field of oceanography and maritime meteorology will be kept in the foreground, especial attention being devoted to the northern fisheries, with a view to the possible opening of new fields for French enterprise in this direction. The mineral resources of the lands visited will also be an object of study. The *personnel* of the expedition will number twenty, including, besides naval officers and seamen experienced in the Iceland fishery, a doctor, a naturalist, and a fur-hunter. Captain Bénard hopes to obtain a grant in aid of his fund from the French Government, a committee of the Institute having been appointed to report on the project.

Lieut. Shackleton's Expedition.—A Reuter telegram despatched from Lyttelton, New Zealand, on January 1, announced the departure for the Antarctic, at 5.30 p.m. on that day, of the *Nimrod*, Lieut. Shackleton's vessel, under tow by the *Koonya*, belonging to the Union Steamship Company of New Zealand. The voyagers received an enthusiastic send-off from the townspeople. A fortnight later the pack was reached, the *Koonya* then returning and bringing the leader's last messages before entering on the serious work of the expedition. The *Nimrod* is said to have behaved well in the gales experienced.

MATHEMATICAL AND PHYSICAL GEOGRAPHY.

Earthquakes and Mountain-building.—It is no new idea that a close relation exists between earthquakes and the tectonic forces to which the great mountain ranges of the world owe their origin. But the precise nature of the relation has not, perhaps, been sufficiently worked out in detail, so that a

contribution to this side of the question, made by Prof. Frech in a recent number of *Petermanns Mitteilungen* (1907, No. 11), deserves some attention. The writer points out that no attempt had previously been made to show graphically on a map the geographical distribution of earthquakes side by side with that of the more recent and mobile, as contrasted with the older and more consolidated portions of the Earth's crust, and this omission he supplies in a map which accompanies his paper. The close agreement between the distribution of world-shaking earthquakes (for, like some other writers, Prof. Frech draws a more or less sharp line of distinction between these and the minor disturbances of a more local and less deep-seated character) and that of the great areas of Tertiary mountain-building, is thus forcibly brought out. In the paper itself, after tracing the general accordance between the two sets of phenomena, Prof. Frech discusses in detail the various regions of more recent tectonic activity, and shows the way in which the character of such action influences the distribution of earthquakes. Both the fractured block-ranges of the eastern Asiatic (or Pacific) type and the folded ranges of Alpine type are prolific of earthquakes, though there are differences in the mode of action in the two cases, the differential movement towards the vast depths of the Pacific being an important factor in the former. A consideration of the mountain ranges of Western North America, which partake of the nature of both types, leads to the conclusion that it is the age of the mountain-folding which especially determines the extent of seismicity, and that fracture and depression are of less importance than elevation and folding. Thus the recent folded ranges of Mexico are particularly subject to earthquakes. The oceans and the deep troughs in the neighbourhood of recent folded ranges, such as those lately brought to light in the Western Pacific, are important centres of disturbance, as are also the sites of sunken continental masses, as, *e.g.*, part of the North Atlantic and Indian oceans. As regards regions of continental fracture, the relative freedom from seismicity of the region of the East African rift is remarkable, though it may perhaps be explained by the relief to strain afforded here by volcanic action, in the immediate neighbourhood of which earthquakes do not, as a rule, occur. The older mountain chains, too, are little disturbed by earthquakes unless, as is the case in parts of Central and Western Asia, they are flanked on either side by newer folded ranges, to the influence of which they are thus subjected.

GENERAL.

Lectureship in Geography at Edinburgh University.—We learn with much pleasure that Mr. G. G. Chisholm, M.A., B.Sc., has been appointed Lecturer on Geography at Edinburgh University, where he will take up his new duties in October next.

The Late Sir Leopold M'Clintock.—In the obituary of Sir Leopold M'Clintock in the January number of the *Journal*, it should have been stated that the collection of fossils brought home by him was obtained from Mr. Olrik, the Inspector of North Greenland.

OBITUARY.

General Sir Frederic J. Goldsmid, K.C.S.I., C.B.

The death of General Sir Frederic John Goldsmid removes a well-known member of the Royal Geographical and Royal Asiatic Societies, and serves once again to mark the passing changes which so rapidly and so surely are affecting our relations with the East. Sir Frederic joined the army in India in days when India was only just

reaching out for Imperial honours. Those were days when every young officer had a career before him if he was gifted with the spirit of enterprise and application. There could have been no Burton if there had been no unexplored Africa and Arabia. There could have been no Goldsmid had Europe and India been linked up by telegraph (as they will be by railway ere long), and had Baluchistan and Persia been open fields for the traveller in the middle of the last century. Doubtless Goldsmid owed much to his early training. Born at Milan in 1818, and educated in Paris and London, he had laid the foundation for that mastery of languages which so distinguished him before he turned his steps to the East. He entered the Madras army in 1839, and had earned the war medal for China before 1842, and within the next ten years he had passed as interpreter in Hindustani, Persian, and Arabic. In 1851 he was Assistant Adjutant-General of the Nagpur subsidiary force. At this period he took to a civil career, and was very soon on special political duty in Sind. That meant that he soon passed as interpreter in Sindi. In 1855 he joined the Turkish force on the military staff of Sir R. Vivian, and naturally passed in Turkish, and received the English and Turkish medals with a brevet majority. Again we find him on political duty in Sind under Sir Bartle Frere during the Mutiny, when he much distinguished himself in carrying out various risky missions and in dealing with the mutineers. As an indication of his all-round usefulness as a public servant, it may be recorded that he was Assistant Commissioner in the Political, Educational, and General, as well as the Revenue Departments of Bombay.

In 1861 he first became connected with the great scheme for linking up East and West by telegraph, with which his name has been so long and so honourably connected. He first laid the basis for telegraph construction by his mission to the chiefs of Baluchistan and Makran in that year; and in 1864 (after a period of comparative rest at home) he was associated with Colonel Patrick Stewart, R.E., in the laying of the Persian gulf cable. After an adventurous journey *viâ* Bagdad and Mosul to Constantinople, he was appointed Director-General of the Indo-European Telegraph on the death of Colonel Stewart in 1865, and at once proceeded *viâ* Russia to Tehran, to assist in negotiating the telegraph treaty. From Tehran he proceeded overland to India—a risky journey in those days—and from Simla he travelled to Europe, Tehran again, India, back again to England, and to France, to settle the terms of admission of the Indo-European telegraph into the general European system. Sir H. Yule computed that about this time he travelled 5700 miles in Persia and Baluchistan alone, with just the links necessary to take him to Bagdad on one side and Karachi on the other.

It was in 1870 that he was selected as commissioner to settle the Persian-Afghan frontier in Seistan, and incidentally that of the Perso-Baluch frontier also, and he travelled from England *viâ* Tehran to Ispahan and Kerman in the genial month of August for that purpose. It was a difficult and delicate task, and it was not until he had paid a second visit to Seistan that the thorny question was temporarily settled. Since Sir Frederic's arbitration two boundary commissions have again visited eastern Persia, the one to determine the Perso-Baluch frontier, and the other to readjust the Perso-Afghan line in Seistan. But no modern commission working in the old field has met with a tithe of the difficulty (chiefly arising from the shuffling diplomacy of Persia) that was encountered by Sir Frederic; and it is indeed a splendid testimony to his tact and ability that he was able to arrive at any result at all with such an unsatisfactory crew of determined procrastinators as were represented by the staff of the Persian commission. For this service Sir Frederic obtained the honour of Knight Commander of the Star of India. On January 1, 1875, Sir Frederic retired from active service with the rank of Major-General.

Since then he has served on various commissions (notably in Egypt during the war), and accepted an appointment as Administrateur Délégué du Compte de l'Association Internationale, "to carry out special measures for the organization of the new Congo State." This journey up the Congo resulted in a severe illness, and he returned to London on December 31, 1883.

Sir F. Goldsmid was the author of 'Telegraph and Travel,' the biography of Sir James Outram, and many pamphlets, addresses, and reviews, published from time to time, separately, or in the Press and serials. He has besides edited and prefaced a work on 'Eastern Persia,' under the authority of the In ia Office. His knowledge of the Eastern languages placed him among the foremost of Oriental critics. He was a Vice-President of the Royal Geographical and Asiatic Societies, and in 1886 he was President of the Geographical section of the British Association at the Birmingham meeting.

Sir F. Goldsmid, in 1849, married the daughter of Lieutenant-General George Mackenzie Steuart, and had two sons and four daughters.

T. H. Holdich.

CORRESPONDENCE.

On the Influence of Ice-melting on Oceanic Circulation.

With reference to the remark of Dr. Otto Pettersson on the temperatures obtained by Sir John Ross in Baffin's bay in 1818 (see *Geog. Journal* for December, 1907, p. 174), I should like to draw Dr. Pettersson's attention to the fact that Sir J. Ross had in his vessel a pair of clamms, constructed under his own supervision, which brought up from the bottom, each time they were used, about 5 or 6 lbs. of mud, and that the temperature of the mud was taken on each occasion and found to agree with the temperature obtained by the self-registering thermometers. I think Ross's results, therefore, can hardly be attributed to imperfect instruments.

The instrument makers one hundred years ago were perfectly capable of constructing ordinary thermometers to give accurate results, and they appear to have supplied Ross with thermometers specially constructed to resist pressure, otherwise the results obtained would not have shown a steady decrease of temperature as the depth increased. Moreover, Sir Edward Sabine, who accompanied Ross in his expedition, informed Sir Wyville Thomson in 1870 that the thermometers were guarded in somewhat the same way as they are at present. The resulting temperatures, having been checked by observation of the temperature of the mud brought up from the bottom, cannot therefore be lightly thrown on one side as due to imperfect instruments.

T. H. Tizard.

On North Polar Problems.

Washington, D.C., December 30, 1907.

Dr. Nansen's lecture, entitled "On North Polar Problems," published in the November and December numbers of the *Geographical Journal*, while criticizing certain portions of my paper published in the Report of the Eighth International Geographic Congress, has failed to cover what I consider the two most significant items in that paper, viz.—

1. The fact that the flood at Point Barrow comes from the west, and not from the north or east, as Dr. Nansen's hypothesis necessitates.

2. The fact that the range of the tropic diurnal wave (especially on the Bering

strait side) is decidedly smaller than the range which would necessarily result from the action of the diurnal forces upon a deep basin of the dimensions he proposes.

In connection with these items, it should be borne in mind that the semi-daily tidal forces vanish at the pole, while the diurnal forces there have maximum values. Hence the semi-daily tide in the Arctic waters must be chiefly derived from the tide of the Atlantic, while a considerable diurnal tide would necessarily originate in a deep lake-like Arctic basin as extended as that pictured by Nansen. For illustration, the computed equilibrium tides at Duluth, Lake Superior, agree well with the observed values.

The fact that the (tropic) range of the diurnal wave is 0·5 foot at Point Barrow instead of 0·7 foot, as the forces require, proves conclusively that the dimensions of the deep Arctic basin are more contracted than Dr. Nansen has supposed.

It may be added that at every place where the diurnal tide has been ascertained from observation around the margin of this supposed basin, the ratio between the two principal constituents of the diurnal tide differs sensibly from that between the corresponding forces. This indicates that the lake-like deep basin is not sufficiently large for enabling the equilibrium diurnal tide to completely mask the small and irregular diurnal wave from the Atlantic. At Duluth, where equilibrium tides prevail, this tidal ratio agrees well with the force ratio.

In reply to Dr. Nansen's criticisms of my statements concerning certain currents, it may be said that in the first sentence of my paper I called attention to the fact that these currents are surface drift currents. I may have been misinformed in reference to the character of these currents as well as to that of the ice, for most of my conclusions were based upon statements to which references are given in my paper. In fact, Captain Mikkelsen's recent experience indicates that the west-going drift occurs north-eastward from Point Barrow, and it seems quite likely that it extends still further eastward. As counter-currents generally accompany drift-currents either as feeble currents below the surface or as lateral return currents, I fail to see where the distribution of land and water as outlined in my paper presents any necessary physical difficulties.

The east-going current north of Greenland, and the accelerated motion of the *Jeannette* during the last few weeks of her voyage, are mentioned in my paper, and certain inferences are there drawn from these facts.

Dr. Nansen says, "Mr. Harris does not, however, take up for discussion the difficult problem of the tidal phenomenon in the north polar sea," etc. In reply to this statement, I have only to say that results from all observations known to me to exist at the time of writing my paper were used in trying to ascertain the behaviour of the tide. There can be no reasonable doubt concerning the reliability of the observations at Point Barrow, Franz Josef Land, and Bennet island.

I fear that my critic has not consulted the charts of cotidal lines which were constructed at the time when the paper to which he refers was written (see Fig. 23-26, Appendix No. 5, Coast and Geodetic Survey Report for 1904).

The semi-daily range of tide at Teplitz bay, Franz Josef Land, is 1·1 foot, and that at Bennet island 2·0 feet. Of course, the shoaling around this island would tend to somewhat increase the range; but if the tide-wave were spread out over the supposed basin, it seems impossible that a range of 2 feet should occur at Bennet island. Furthermore, the directions of the drift-arrows shown on Fig. 4 of Dr. Nansen's paper, at least, suggest comparative narrowness for the deep Arctic basin.

It is highly desirable to have information concerning the tides along the coast of Siberia, for it seems probable that the range would be much greater to the west of the New Siberian islands than it would be to the east of them.

Up to the present time, no results from the tidal observations taken on the

recent Peary Expedition, or from those taken on the Mikkelsen-Leffingwell Expedition, have come to my knowledge. They will doubtless turn out to be of considerable importance in connection with north polar problems.

R. A. HARRIS.

The "Snake Kyaung" Monastery, Burma.

9, Windsor Road, Rangoon (Burma), 21-11-07.

I beg to inform you that I brought to the notice of the Chief Secretary to the Government of Burma the matter of the forgotten 'Snake Kyaung' referred to by Colonel Hobday in his review of the new book on 'Burma' by Sir George Scott, and published at pp. 432 and 433 of the *Geographical Journal* for October, 1907.

I have just received a reply from that officer to say, "Mr. Taw Sein Ko writes to say that the 'Snake Monastery' of Colonel Hobday has been identified as the 'Mogaung Kyaung,' and that a proposal for its conservation will be submitted in due course."

Mr. Taw Sein Ko, a Burmo-Chinese gentleman, who succeeded the late learned Dr. Forchammer in the post, is the Government archæologist in Burma.

J. C. CLANCEY.

MEETINGS OF THE ROYAL GEOGRAPHICAL SOCIETY, SESSION 1907-1908.

Christmas Lecture, Friday, January 3, 1908.—"The Land of the Black Mountain, Montenegro, as I saw it." By the Rev. T. T. Norgate.

Christmas Lecture, Monday, January 6, 1908.—"Journeys through Lonely Labrador." By Mrs. Leonidas Hubbard.

Fifth Meeting, January 13, 1908.—Colonel G. Earl Church in the Chair.

ELECTIONS.—*Captain Willoughby Furnwall, R.F.A.; Walter Meakin; Henry Frederick Merrill; Major Albert Pearse, R.A.M.C.; George Blount Tunstall-Moore; Harold Whitaker.*

The paper read was:—

"Among the Volcanoes of Guatemala and St. Vincent." By Dr. Tempest Anderson.

GEOGRAPHICAL LITERATURE OF THE MONTH.

Additions to the Library.

By EDWARD HEAWOOD, M.A., *Librarian*, R.G.S.

The following abbreviations of nouns and the adjectives derived from them are employed to indicate the source of articles from other publications. Geographical names are in each case written in full:—

A. = Academy, Academie, Akademie.
Abh. = Abhandlungen.
Ann. = Annals, Annales, Annalen.
B. = Bulletin, Bollettino, Boletim.
Col. = Colonies.
Com. = Commerce.
C.R. = Comptes Rendus.
E. = Erdkunde.
G. = Geography, Géographie, Geografia.
Ges. = Gesellschaft.
I. = Institute, Institution.
Iz. = Izvestiya.
J. = Journal.
Jb. = Jahrbuch.
k.k. = kaiserlich und königlich.
M. = Mitteilungen.
Mag. = Magazine.
Mem. (Mém.) = Memoirs, Mémoires.
Met. (mét.) = Meteorological.
P. = Proceedings.
R. = Royal.
Rev. (Riv.) = Review, Revue, Rivista.
S. = Society, Société, Selskab.
Sc. = Science(s).
Sitzb. = Sitzungsbericht.
T. = Transactions.
Ts. = Tijdschrift, Tidskrift.
V. = Verein.
Verh. = Verhandlungen.
W. = Wissenschaft, and compounds.
Z. = Zeitschrift.
Zap. = Zapiski.

On account of the ambiguity of the words *octavo*, *quarto*, etc., the size of books in the list below is denoted by the length and breadth of the cover in inches to the nearest half-inch. The size of the *Journal* is 10 × 6½.

A selection of the works in this list will be noticed elsewhere in the "Journal."

EUROPE.

Adriatic—Tide-levels. *M. k.k. militarg. I.* **26** (1906): 57–141. **Gregor.**
Die Höhe des Mittelwassers in Rogoznica, Zara, und Sestrice. Von Julius Gregor.

Austria—Cartography. *M. k.k. militarg. I.* **26** (1906): 145–171. **Frank.**
Das Gerippe in den Kriegskarten. Von Otto Frank.

Austria—Istria. *G. Abhandlungen* (*Penck*) **9** (1907): No. 2, pp. iv. and 166. **Krebs.**
Die Halbinsel Istrien. Landeskundliche Studie. Von Dr. Norbert Krebs. *With Maps and Illustrations.*

Austria—Styria. *Deutsche Erde* **6** (1907): 42–48. **Pfaundler.**
Die deutsch-slowenische Sprachgrenze in Steiermark. Von Dr. Richard Pfaundler. *With Map and Illustrations.*

Austria—Triangulation. **Hartenthurn.**
Die Tätigkeit des K. u. K. Militärgeographischen Institutes in den letzten 25 Jahren (1881 bis Ende 1905). Von Vincenz Haardt von Hartenthurn. Wien, 1907. Size 9 × 6, pp. xviii. and 612. *Maps. Presented by the Institute.*

Baltic—Seiches. *Beiträge zur Geophysik* **8** (1907): 367–399. **Doss.**
Ueber ostbaltische Seebären. Von Prof. Dr. Bruno Doss. *With Sketch-maps.*

Europe—Anthropology. **Arbo.**
Forhandl. Videnskabs.-S., Christiania, 1906 (1907): No. 6, pp. 22.
De blonde Brachycepal og dens sandsynlige Udbredningsfelt. Af C. O. E. Arbo. *With Illustrations.*

France—Hautes-Pyrénées. *La G., B.S.G. Paris* **16** (1906): 1–18. **Eydoux and Maury.**
Les glaciers orientaux du Pic Long (Pyrénées centrales). Par D. Eydoux et L. Maury. *With Maps, Illustrations, and Diagrams.*

France—Oise. *Ann. G.* **16** (1907): 309–315. **Demangeon.**
La "Trouée de l'Oise." Par A. Demangeon. *With Maps.*

Germany—Coasts. *Ann. Hydrographie* **35** (1907): 289–296. ———
Die Eisverhältnisse an den deutschen Küsten im Winter 1906–07. *With Diagrams.*

Italy—Venice. **Douglas.**
Venice on foot; with the itinerary of the Grand Canal, and several direct routes to useful places. By Hugh A. Douglas. London: Methuen & Co., 1907. Size 7 × 4, pp. x. and 422. *Plans and Illustrations. Price 5s. net. Presented by the Publishers.* [See notice on p. 99, *ante*.]

Italy—Vesuvius. *Ann. G.* **16** (1907): 289–295. **Glangeaud.**
L'Éruption du Vésuve en Avril 1906. Par Ph. Glangeaud.

Mediterranean—Tides. *Ann. Hydrographie* **35** (1907): 356–371. **Wegemann.**
Beiträge zu den Gezeiten des Mittelländischen Meeres. Von Dr. G. Wegemann. *With Charts and Diagrams.*

Norway—Coast. **Hoel.**
Forhandl. Videnskabs-S., Christiana, 1906 (1907): No. 4, pp. 16.
Den marine Grænse ved Veltjorden. Af Adolph Hoel. *With Illustrations.*
Describes some newly discovered caves, and discusses their relation to old shore-lines.

Norway—Coasts. ———
Norway Pilot. Part i. From the Naze to Christiania; thence to the Kattegat. 4th edit. London: J. D. Potter, 1907. Size 9½ × 6, pp. xxx. and 510. *Index-chart. Price 3s. 6d. Presented by the Hydrographer of the Admiralty.*

Norway—Glaciers. **Øyen.**
Forhandl. Videnskabs-S., Christiania, 1906 (1907): No. 7, pp. 18.
Femten Aars glaciologiske Iagttagelser. Af P. A. Øyen.

Norway and Sweden. *B.S.R. Belge G.* **31** (1907): 193–233. **Bihot.**
La rupture scandinave: étude anthropogéographique. Par Ch. Bihot.

Russia—Dnieper. *Annuaire géol. et minière, Russie* **8** (1906): 74–108. **Oppokof.**
Zur Frage über die Entstehungsweise und das Alter der Flussthäler in dem Mittelgebiet des Dnieperbassins. Von E. Oppokow. [In Russian and German.] *With Sections.*

Spain—Granada. **Calvert.**
Granada and the Alhambra: a brief description of the ancient city of Granada, with a particular account of the Moorish palace. By Albert F. Calvert. London: John Lane. Size 8 × 5, pp. xxxvi. and 90. *Plans and Illustrations. Price 3s. 6d. net. Presented by the Publisher.* [See notice on p. 212, *ante*.]

Switzerland—Pottery-clays. **Letsch and others.**
Die schweizerische Tonlager. Herausgegeben von der Schweiz. Geotechnischen Kommission. I. Geologischer Teil, von Dr. E. Letsch. II. Technologischer Teil, von B. Zschokke; mit einer Beilage. . . . von B. Zschokke und Dr. L. Rollier. III. Volkwirtschaftlicher Teil, von Dr. R. Moser. (*Beiträge zur Geologie der Schweiz*, Geotechnischer Serie, iv. Lieferung.) Bern, 1907. Size 12½ × 9½, pp. x., 434, 198, and 50. *Maps, Sections, and Illustrations.*

United Kingdom. ——
Memoirs of the Geological Survey. Summary of progress on the geological survey of Great Britain and the Museum of Practical Geology for 1906. London: E. Stanford, 1907. Size 10 × 6, pp. 182. *Illustrations. Maps in separate cover.*

United Kingdom—England. **Baker and Balch.**
The Netherworld of Mendip: explorations in the great caverns of Somerset, Yorkshire, Derbyshire, and elsewhere. By Ernest A. Baker and Herbert A. Balch. Clifton: J. Baker & Son, 1907. Size 9 × 6, pp. xii. and 172. *Sketch-map and Illustrations. Price 7s. 6d. net. Presented by the Publishers.* [See p. 99, *ante*.]

United Kingdom—Scotland. **Wilkinson and others.**
Memoirs of the Geological Survey, Scotland. The explanation of Sheets 19 and 27, with the western part of sheet 20. The Geology of Islay, including Cronsay and portions of Colonsay and Jura. By S. B. Wilkinson, with notes by J. J. H. Teall and B. N. Peach. Glasgow: J. Hedderwick & Sons, 1907. Size 10 × 6, pp. viii. and 82. *Sketch-map and Illustrations. Price 2s. 6d. Presented by the Geological Survey.*

ASIA.

Chinese Turkestan. *B. American G.S.* **39** (1907): 268–272. **Huntington.**
Archæological discoveries in Chinese Turkestan. By Ellsworth Huntington.

Eastern Asia—Sakhalin. *J. Tōkyō G.S.* **19** (1907): 285–301. **Jimbō.**
On the Orography and Geology of Karafuto. By Kotora Jimbō. [In Japanese.]

Eastern Asia—Sakhalin. *J. Tōkyō G.S.* **19** (1907): 374–386. **Kawasaki.**
Coalfields of Karafuto. By Hantarō Kawaski. *With Map.* [In Japanese.]

Eastern Asia—Sakhalin. *J. Tōkyō G.S.* **19** (1907): 213–221. **Shiga.**
On the delimitation of the Japono-Russian Boundary in Karafuto. By Shigetaka Shiga. [In Japanese.]

India—Bengal. *Mem. Asiatic S. Bengal* **2** (1907): 43–84. **Bainbridge.**
The Saorias of the Rajmahal hills. By R. B. Bainbridge. *With Illustrations.*
The writer doubts the Dravidian affinities of these hillmen.

India—Irrigation. *J.S. Arts* **55** (1907): 774–794. **Robertson.**
Irrigation Colonies in India. By Laurence Robertson. *With Diagrams.*

Indian Ocean—Seychelles. **Dupont.**
Report on a visit of investigation to St. Pierre, Astove, Cosmoledo, Assumption, and the Aldabra group of the Seychelles islands. By R. Dupont. Seychelles, 1907. Size 13 × 8, pp. 52. *Maps. Presented by the Colonial Office.*
This will be dealt with in a special article.

Japan. ——
The Seventh Financial and Economic Annual of Japan, 1907. Tokyo: Government Printing Office. Size 10½ × 7½, pp. vi., 196, and 30. *Map and Diagrams. Presented by the Minister of Finance, Tokyo.*

Japan—Asama-Yama. *Sierra Club B.* **6** (1907): 186–195. **Wicher.**
The Ascent of Asama-Yama. By the Rev. Prof. Edward A. Wicher. *With Illustrations.*

Japan—Aso. *Popular Sc. Monthly* **71** (1907): 29–49. **Anderson.**
The Great Japanese Volcano Aso. By Robert Anderson. *With Illustrations.*
See monthly record, November, p. 560.

Japan—Dalny. ———
Trade of Tairen (Dalny) for the last seven months of the year 1906. By Mr. Vice-Consul H. G. Parlett. Foreign Office, Annual No. 3854. Size 9½ × 6. pp. 12. *Price 1d.*
The port was thrown open to foreign trade in September, 1906, within the period covered by this report. No inrush by foreign merchants had so far occurred.

Japan—Structure. *J. Tōkyō G.S.* **19** (1907): 92–117. **Ogawa.**
On the Geotectonic of South-West Japan. By Takudzi Ogawa. [In Japanese.]

Japan—Tides. *J. Tōkyō G.S.* **19** (1907): 83–91. **Honda.**
The Tidal Current of Naruto. By Hōtarō Honda. *With Maps.* [In Japanese.]

Malay Archipelago—Borneo. **Gomes.**
The Sea-Dyaks of Borneo. By the Rev. Edwin H. Gomes; with a chapter on missionary work amongst the Dyaks by the Ven. A. F. Sharp. London: Society for the Propagation of the Gospel, 1907. Size 7½ × 5, pp. iv. and 7. *Map and Illustrations. Price* 1*s. net. Presented by the S.P.G.* [See p. 212, *ante*.]

Malay Archipelago—Hydrography. *Ann. Hydrographie* **35** (1907): 296–305. ———
Ueber die Gezeiten in der Madura- und in der Soerabaja-Strasse, sowie Verbesserung der Tiefen im westlichen Teile der Soerabaja-Strasse. *With Diagrams.*

Malay Archipelago—Java. **Veth.**
Java: geographisch, ethnologisch, historisch. Door Prof. P. J. Veth. 2e druk, bewerkt door Joh. F. Snelleman en J. F. Niermeyer. 4 vols. Haarlem: F. Bohn, 1896–1903. Size 10 × 6½, pp. (vol. **1**) viii. and 396; (vol. **2**) 438; (vol. **3**) viii. and 602; (vol. **4**) viii. and 579. *Maps and Portrait. Purchased.*
This edition of Veth's standard work has been thoroughly revised and brought up to date, the editors having begun their task so far back as 1895.

Persia. **Williams.**
Across Persia. By E. Crawshay Williams. London: E. Arnold, 1907. Size 9 × 5½, pp. xii. and 348. *Map and Illustrations. Price* 12*s. 6d. net. Presented by the Publisher.* [See notice at p. 100, *ante*.]

Philippine Islands. *Philippine J. Sc.* **2** (1907): 115–129. **Bacon.**
The crater lakes of Taal volcano. By Raymond Foss Bacon. *With Illustrations.*

Philippine Islands. *Philippine J. Sc.* **1** (1906): 1045–1058. **Smith.**
Contributions to the physiography of the Philippine Islands. By Warren D. Smith. I. Cebu Island. *With Illustrations.*
See note in the monthly record.

Russia—Kamchatka. **Tuchoff.**
Mem. Imp. Russian G.S., General G. **37** (1906): No. 2, pp. xii. and 522.
Le long de la côte occidentale de Kamtchatka. Par V. N. Tuchoff. *With Map.* [In Russian.]

Russia—Siberia. *Petermanns M.* **53** (1907): 154–158. **Sibiriakof.**
Der Weg vom Flusse Kolyma zum Ochotskischen Meere und Ola als Seehafen für das Kolyma-Gebiet. Von A. Sibiriakow.

Siam—Laos. *B. Comité Asie française* **7** (1907): 268–294. **Lajonquière.**
Le Laos siamois. La vallée de la Se Moun: le monthon Nakhon Rachasi Ma (Korat), et le monthon Isan (Oubon). Par le commdt. L. de La Jonquière. *With Maps.*

Western Asia. *La G., B.S.G. Paris* **16** (1907): 67–70. **Lacoste.**
Autour de l'Afghanistan par le Karakorum et le petit Tibet. Par le Commdt. de Lacoste. *With Sketch-map.*

AFRICA.

Africa. *Fortnightly Rev.* (1907): 320–324. Johnston.

The disposal of Africa. By Sir H. H. Johnston.

Africa—British Protectorates.

The surveys of British Africa. The annual report of the Colonial Survey Committee. Second year, to July, 1907. (Colonial Reports, Annual No. 532.) London, 1907. Size 9½ × 6, pp. 60. *Maps and Illustrations. Presented by the Colonial Office.*

Africa—Language. Jacottet.

Bantu phonetics. By Rev. E. Jacottet. (Supplement to *Christian Express*, September, 1907.) Lovedale, 1907. Size 13½ × 8½, pp. 12.

See Review, *ante*, p. 94.

Algeria—Economics. *B. Comité Afrique Française* **17** (1907): 201–209. Bernard.

L'Outillage de L'Algérie. Par Augustin Bernard. *With Map.*

Cape Colony. *Scottish G. Mag.* **23** (1907): 393–421. Elliot.

Notes and observations on an expedition in the western Cape Colony. By Lieut. J. A. S. Elliot. *With Map and Illustrations.*

The route led from Carnarvon to Upington on the Orange river, and thence to Pricska.

Central Africa—Botany. *J. Linnean S. (Botany)* **38** (1907): 18–98. Rendle.

General report upon the Botanical results of the Third Tanganyika Expedition, conducted by Dr. W. A. Cunnington, 1904 and 1905. By Dr. A. B. Rendle.

Deals only with the higher plants collected from the three lakes visited; the fresh-water algæ, which formed the bulk of the collections, being discussed in a separate paper. The former throw no light on the past relations of the lakes.

Congo State. *Mouvement G.* **24** (1907): 391–396. Dauzat.

Le lac Leopold II. et ses affluents. Par Albert Dauzat. *With Map.*

Congo State—Ethnology. *B.S.R. Belge G.* **31** (1907): 171–192, 234–251. Harroy.

Ethnographie congolais: les Bakubas. Par F. Harroy. *With Map and Illustrations.*

Eritrea. *Riv. G. Italiana* **14** (1907): 259–274. **Dainelli and Marinelli.**

Escursione al vulcano Alid (Colonia Eritrea). Appunti di G. Dainelli e O. Marinelli. *With Map.*

German East Africa. *Naturw. Wochenschrift* **22** (1907): 513–521, 529–536. Schröder.

Am Ostrande des Parchgebirges entlang zum Kilimandscharo. Von Dr. Christoph. Schröder. *With Illustrations.*

Madagascar. *S.G. Com. Paris* **29** (1907): 369–393. Geay.

Aperçu sur les régions Sud de Madagascar. Par F. Geay.

Madagascar—Historical. Grandidier.

Collection des ouvrages anciens concernant Madagascar. Tome v. Ouvrages ou extraits d'ouvrages anglais, hollandais, portugais, espagnols, suédois et russes (1718–1800). Par Alfred Grandidier et Guillaume Grandidier. Paris: Comité de Madagascar, 1907. Size 10 × 6½, pp. 548. *Map and Facsimile Illustrations. Price* 25*s.*

This volume includes a number of minor pieces concerned with visits to or descriptions of Madagascar. The first portion deals with the doings of the pirates in the early part of the eighteenth century.

Nigeria—Northern.

Northern Nigeria. Correspondence relating to Sokoto, Hadeija, and the Munshi country. London, 1907. Size 13 × 8½, pp. vi. and 62. *Price 7d.*

Relates to disturbances during 1906.

Nile Basin. Lyons.

The rains of the Nile Basin and the Nile Flood of 1906. By Captain H. Lyons. (Survey Department paper, No. 2.) Cairo, 1907. Size 10½ × 7½, pp. 70. *Maps and Diagrams.*

Rhodesia. *Smithsonian Misc. Coll.* **50** (No. 1703, 1907): 35–47. Andrews.

The "Webster" Ruin in Southern Rhodesia, Africa. By Edward M. Andrews. *With Illustrations.*

Sahara—Ain-Salah. *Ann. G.* **16** (1907): 337–349. **Métois.**

Ain-Salah et ses dépendances. Par A. Métois. *With Map.*

Sahara—Bilma. *Rev. Coloniale* (1907): 361–386. **Gadel.**

Notes sur Bilma et les oasis environnantes. Par Commandant Gadel.

South Africa—Ethnology. **Hall.**

Notes on the traditions of South African races, especially of the Makalanga of Mashonaland. Being a reply, founded on Native traditions, to Prof. MacIver's conclusions as to the age of Great Zimbabwe. By R. N. Hall. (Reprinted from the *African Monthly*.) Grahamstown, 1907. Size 9½ × 6, pp. 288–310.

The writer argues that traditions of the building of Zimbabwe and other structures would have existed if they had been mediæval in date.

West Africa. **Montmorres.**

Liverpool University: Institute of Commercial Research in the Tropics. The commercial possibilities of West Africa. By Viscount Montmorres. Liverpool, 1907. Size 9½ × 6½, pp. 24.

NORTH AMERICA.

Alaska—Malaspina Glacier. *B. American G.S.* **39** (1907): 273–285. **Tarr.**

The Malaspina Glacier. By Ralph S. Tarr. *With Map and Illustrations.*

See note in vol. **29**, p. 460.

Alaska—Seward Peninsula. *B.G.S. Philadelphia* **5** (1907): 10–20. **Smith**

Settlements and climate of the Seward Peninsula, Alaska. By Philip S. Smith. *With Sketch-map and Illustrations.*

Alaska—Yakutat Bay. **Tarr.**

Recent advance of glaciers in the Yakutat Bay region, Alaska. By Ralph S. Tarr. (*Bulletin of the Geological Society of America*, vol. **18**, pp. 257–286.) New York, 1907. Size 10½ × 7, pp. [30]. *Map and Illustrations. Presented by the Author.*

Cf. note in the *Journal* for April, 1907, p. 460.

America—Ethnology. **Friederici**

Die Schiffahrt der Indianer. Von Dr. Georg Friederici. (Studien und Forschungen zur Menschen- und Völkerkunde; unter wissenschaftliche Leitung von Georg Buschan; I.) Stuttgart: Strecker & Schröder, 1907. Size 9¼ × 7, pp. viii. and 130. *Illustrations. Price* 4*m. Presented by the Publishers.*

Canada—British Columbia. ——

Annual report of the Minister of Mines for the year ending December 31, 1906, being an account of Mining Operations for Gold, Coal, etc., in the Province of British Columbia. Victoria, B.C., 1907. Size 10½ × 7, pp. 276. *Map, Illustrations, and Tables. Presented by the Department of Mines, Victoria, B.C.*

Canada—Rockies. *Canadian Alpine J.* **1** (1907): 138–148. **Vaux.**

Glacier observations. By George Vaux and William S. Vaux. *With Map and Illustrations.*

Canada—Rockies. *Canadian Alpine J.* **1** (1907): 149–158. **Wheeler.**

Observations of the Yoho glacier. By A. O. Wheeler. *With Maps and Illustrations.*

Mexico. **Martin.**

Mexico of the twentieth century. By Percy F. Martin. 2 vols. London: E. Arnold, 1907. Size 9 × 5½, pp. (vol. **1**) xxiv. and 324; (vol. **2**) xiv. and 330. *Map, Plan, and Illustrations. Price* 30*s. net. Presented by the Publisher.* [To be reviewed.]

Mexico. **Diener.**

Reise in das moderne Mexico: Erinnerungen an den x. Internationalen Geologenkongress in Mexico. Von Mietze Diener. Wien, etc.: A. Hartleben, 1908 [1907]. Size 9 × 6, pp. 112. *Map and Illustrations. Price* 3*m. Presented by the Publisher.*

Mexico—Ethnology. **Lares.**

Etnografía del estado Merida . . . Por Jose Ignacio Lares. Segunda edición. Mérida, 1907. Size 7½ × 5, pp. 52.

Newfoundland. Millais.

Newfoundland and its untrodden ways. By J. G. Millais. London: Longmans, Green, & Co., 1907. Size 10½ × 7, pp. xvi. and 340. *Maps and Illustrations. Price* 21*s. net. Presented by the Publishers.* [To be reviewed.]

Newfoundland, etc. ——

The Newfoundland and Labrador pilot, including the Strait of Belle Isle. 4th edit. London, 1907. Size 9½ × 6, pp. xx. and 818. *Index-chart.*

North America. Heaton.

A scientific geography. IV. North America. By Ellis W. Heaton. London: Ralph, Holland, & Co., 1907. Size 7½ × 5, pp. 130. *Sketch-maps and Diagrams. Price* 1*s.* 6*d. net. Presented by the Publishers.*

United States—Bighorn Mountains. *National G. Mag.* **18** (1907): 355–364. Darton.

Bighorn Mountains. By N. H. Darton. *With Map and Illustrations.*

United States—San Francisco. *Nineteenth Century* (1907): 220–227. Davison.

The San Francisco earthquake of 1906. By Charles Davison.

United States—Seismology. McAdie.

Smithsonian Miscellaneous Collections **49** (1907): No. 1721, pp. 24.

Catalogue of earthquakes on the Pacific Coast, 1897 to 1906. By Alexander G. McAdie.

Compiled as a continuation of Prof. Holden's Catalogue, issued in 1898.

United States—Virginia. *B. American G.S.* **39** (1907): 285–291. Surface.

Racial and Regional Study of the Virginia population. By G. T. Surface.

United States—Virginia. *B. American G.S.* **39** (1907): 397–409. Surface.

Geographic influence on the economic history of Virginia. By G. T. Surface.

CENTRAL AND SOUTH AMERICA.

Bolivia. *Ann. G.* **16** (1907): 350–359. Dereims.

Le haut plateau de Bolivie. Par A. Dereims. *With Section and Illustrations.*

Brazil—Amazon. Craig.

Recollections of an ill-fated expedition to the headwaters of the Madeira river in Brazil. By Neville B. Craig. Philadelphia and London: J. P. Lippincott Co., 1907. Size 9 × 6, pp. 480. *Maps and Illustrations. Price* 18*s. net. Presented by the Publishers.* [To be reviewed.]

Brazil—Ethnology. Koch-Grünberg.

Südamerikanische Felszeichnungen. Von Dr. Theodor Koch-Grünberg. Berlin: Ernst Wasmuth, 1907. Size 11 × 7, pp. iv. and 92. *Map and Illustrations. Presented by the Publisher.* [To be reviewed.]

Brazil—Historical. *Rev. I. Hist. e G. Brazileiro* **67** (1906): Part i., 243–387. ——

Viagens no Brazil.

Apparently reproductions of early documents, but printed without any explanation or introductory matter.

Brazil—Para. *La G., B.S.G. Paris* **16** (1907): 19–26. Ducke.

Voyage au "campos" de l'Ariramba. Par A. Ducke.

Brazil—Parana. ——

Commissão Geografica e Geologica de Estado de S. Paulo. Exploração do Rio Paraná. I. Barra do Rio Tieté ao Rio Paranahyba. II. Barra do Rio Tieté ao Rio Paranapanema. São Paulo, 1907. Size 17½ × 13, pp. 24. *Maps and Illustrations. Presented by the Commission.*

British Guiana. *National G. Mag.* **18** (1907): 373–381. Heilprin.

An impression of the Guiana Wilderness. By Prof. Angelo Heilprin. *With Illustrations.*

Chile. Elliot.

Chile: its history and development, natural features, products, commerce, and present conditions. By G. F. Scott Elliot; with an introduction by Martin Hume. London: T. Fisher Unwin, 1907. Size 9 × 6, pp. xxviii. and 364. *Maps, Illustrations, and Diagrams. Price* 10*s.* 6*d. net. Presented by the Publisher.* [See review, *ante*, p. 96.]

Colombia—Ethnology. **Pittier de Fábrega.**

Ethnographic and linguistic notes on the Paez Indians of Tierra Adentro, Cauca, Colombia. By Henry Pittier de Fábrega. (From the *Memoirs of the American Anthropological Association*, vol. 1, No. 5.) Lancaster, Pa., 1907. Size 10 × 6½, pp. 301–356. *Map and Illustrations. Presented by the Author.*

The Paez Indians inhabit a portion of the Central Cordillera in about 3° N.

Cuba. *B. American G.S.* **39** (1907): 257–268. **Fernow.**

The High Sierra Maestra. By B. E. Fernow. *With Map.*

Ecuador—Geodesy. *C.R.A. Sc. Paris* **145** (1907): 366–370. **Poincaré.**

Rapport présénte au nom de la Commission chargée du contrôle scientifique des operations scientifiques de l'Équateur. Par H. Poincaré.

Peru. **Garland.**

Peru in 1906; with a brief historical and geographical sketch. By Alexander Garland, translated by George R. Gepp. Lima, 1907. Size 13½ × 10, pp. 304. *Maps and Illustrations. Presented by the Author.* [See p. 97, *ante*.]

Peru—Language. **Markham.**

Vocabularies of the general language of the Incas of Peru, or Runa Simi (called Quichua by the Spanish grammarians). By Sir Clements Markham. London, Ballantyne & Co., 1907. Size 6½ × 4½, pp. 252. *Presented by the Author.*

These vocabularies "consist of carefully selected words, and are intended to be useful to . . . English-speaking residents in Peru, to travellers, and also to students of history and philology." They embody Sir Clements Markham's previous contributions to the subject, during a period of over forty years.

South America. **Delebecque.**

A travers l'Amérique du Sud. Par J. Delebecque. Deuxième edition. Paris: Librarie Plon, 1907. Size 7½ × 4½, pp. viii. and 318. *Maps and Illustrations. Presented by the Author.*

A vivid narrative of a journey made in 1904–5, from Lima to Para, *viâ* the Pachitea, Ucayali, and Amazon.

West Indies—Jamaica. **Price.**

The Agricultural Conference, 1907; and the Kingston disaster. Being a record of events in connection with the voyage of the S.S. *Port Kingston* from Barbados to Jamaica and back in January, 1907. Compiled by A. B. Price, 1907. Size 8 × 5, pp. 120. *Illustrations. Price* 1*s*.

West Indies—Jamaica. *Scottish G. Mag.* **23** (1907): 535–543. **Brown.**

The Jamaica earthquake. By Prof. Charles W. Brown.

West Indies—Jamaica. *R. Engineers J.* **6** (1907): 213–217. **Carden and Goldney.**

Notes on the Jamaica earthquake, January 14, 1907. By Captain A. D. Carden and Captain G. T. B. Goldney. *With Illustrations.*

West Indies—Santa Cruz. **Quin.**

The building of an island, being a sketch of the geological structure of the Danish West Indian island of St. Croix, or Santa Cruz. By John T. Quin. Published by the Author in Christiansted, St. Croix, 1907. Size 11½ × 8½, pp. viii. and 106. *Maps, Sections, and Illustrations. Presented by the Author.*

AUSTRALASIA AND PACIFIC ISLANDS.

Australasia. **Macdonald.**

In the land of pearl and gold: a pioneer's wanderings in the backblocks and pearling grounds of Australia and New Guinea. By Alexander Macdonald. London: Blackie & Son, 1907. Size 9 × 5½, pp. xii and 318. *Illustrations. Price* 10*s*. 6*d*. *net. Presented by the Publishers.*

Australasia. **Gregory.**

Stanford's Compendium of Geography and Travel (new issue). Australasia. Vol. 1, Australia and New Zealand. By Dr. J. W. Gregory. 2nd edition. London: E. Stanford, 1907. Size 8 × 5, pp. xxiv. and 658. *Maps and Illustrations. Price* 15*s*. *Presented by the Publisher.* [To be reviewed.]

Pacific Islands. **Grimshaw.**

In the strange South Seas. By Beatrice Grimshaw. London: Hutchinson & Co., 1907. Size 9 × 5½, pp. x. and 382. *Illustrations. Price* 16*s*. *net. Presented by the Publishers.*

POLAR REGIONS.

Arctic. *National G. Mag.* **18** (1907): 446–450. **Peary.**

Nearest the Pole. By Commander Robert E. Peary.

Arctic—Exploration. **Gordon.**

Round about the North Pole. By W. J. Gordon. London: John Murray, 1907. Size 6 × 6, pp. xii. and 294. *Maps and Illustrations. Price* 15*s. net. Presented by the Publisher.*

Most of the illustrations are woodcuts by Edward Whymper.

Arctic—Ziegler Expedition. **Fleming.**

The Ziegler Polar Expedition, 1903–1905: Anthony Fiala, Commander. Scientific results, obtained under the direction of William J. Peters. Edited by John A. Fleming. Washington, D.C., 1907. Size 11½ × 9½, pp. x. and 630. *Maps, Illustrations, and Diagrams. Presented by the Estate of William Ziegler.*

Greenland—Area. *Meddelelser om Grønland* **33** (1907): 121–128. **Frytz.**

Om Grønlands Areal. Beregninger, udfarte paa det af Kommissionen i 1806 udgione Kaart i Maalestokken 1 : 2,000,000. Af H. Frytz. *With Map.*

See note in vol. **30**, p. 567.

MATHEMATICAL GEOGRAPHY.

Mathematical Geography. **Johnson.**

Mathematical geography. By Willis E. Johnson. New York, etc.: American Book Co., [1907]. Size 7½ × 5, pp. 386. *Maps and Illustrations. Price* $1. *Presented by the Publishers.*

PHYSICAL AND BIOLOGICAL GEOGRAPHY.

Climatology. *Beiträge zur Geophysik* **8** (1907): 565–602. **Spitaler.**

Die jährlichen und periodischen Änderungen der Wärmeverteilung auf der Erdoberfläche und die Eiszeiten. Von Prof. Dr. Rudolf Spitaler.

Geophysics. **See.**

On the temperature, secular cooling and contraction of the Earth, and on the theory of earthquakes held by the ancients. By T. J. J. See. (Reprinted from *Proceedings of the American Philosophical Society*, vol. **46**, 1907.) [Philadelphia, Pa., 1907.] Size 9½ × 6½, pp. 191–299. *Diagrams. Presented by the Author.*

Geophysics—Soil-temperatures. *Beiträge zur Geophysik* **8** (1907): 499–564. **Kühl.**

Der jährliche Gang der Bodentemperatur in verschiedenen Klimaten. Von Wilhelm Kühl. *With Diagrams.*

Gravity. *Riv. G. Italiana* **14** (1907): 364–369. **Costanzi.**

Abbozzo d'una carte delle isoanomale della gravità nell' Europa centrale e nel Giappone meridionale. Per Giulio Costanzi. *With Maps.*

Meteorology. **Hepworth.**

Notes on maritime meteorology. By M. W. Campbell Hepworth. London: G. Philip & Son, 1907. Size 8½ × 5½, pp. viii. and 90. *Charts and Diagrams. Price* 2*s.* 6*d. net. Presented by the Publishers.*

Meteorology—Instruments. **Mill.**

Quarterly J.R. Meteorological S. **33** (1907): 265–274.

The best form of rain-gauge, with notes on other forms. By Dr. H. R. Mill. *Illustrations and Diagrams.*

Oceanography—Arctic Ocean. **Knipovich**

Mem. Imp. Russian G.S.; General G. **42** (1906): pp. xii. and 1510.

Grundzüge der Hydrologie des europäischen Eismeeres. Von N. M. Knipowitsch. [In Russian; German *résumé*.]

Oceanography—Currents. **Gehrke.**

Conseil Perm. Explor. Mer; Publ. circonstance, No. 40 (1907): pp. 18.

Mean velocity of the Atlantic currents running north of Scotland and through the English Channel. By Johan Gehrke. *With Sketch-map and Sections.*

Oceanography—Currents. **Knudsen.**
Conseil Perm. Explor. Mer ; Publ. circonstance, No. 39 (1907): pp. 8.
Some remarks about the currents in the North Sea and adjacent waters. By Martin Knudsen.

Oceanography—North Atlantic. **Mecking.**
Ann. Hydrographie **35** (1907): 348–355, 396–409.
Die Treibeiserscheinungen bei Neufundland in ihrer Abhängigkeit von Witterungsverhältnissen. Von Dr. L. Mecking. *With Charts and Diagrams.*
Noticed in the Monthly Record (vol. **30**, p. 661).

Oceanography—Pacific. *Ann. Hydrographie* **35** (1907): 253–259. **Schott.**
Strombeobachtungen I.N.M.S. *Edi* in westlichen Stillen Ozean. Von Prof. Dr. Gerhard Schott. *With Map.*

Oceanography—Relief. **Ricchieri.**
Per la classificazione e denominazione morfografica dei fondi sottomarini. Di G. Ricchieri. (VI. Congresso Geografico Italiano, Venezia, 26–31 Maggio, 1907. Sezione I., Tema ix.) Venezia, 1907. Size 9½ × 6½, pp. 10.

Physical Geography. **Supan.**
Grundzüge der physischen Erdkunde. Von. Prof. D. Alexander Supan. Vierte . . . Auflage. Leipzig: Veit & Co., 1908 [1907]. Size 9 × 6, pp. x. and 936. *Maps, Illustrations, and Diagrams. Presented by the Author.* [To be reviewed.]

Physical Geography. **Salisbury.**
Physiography. By Rollin D. Salisbury. London: John Murray, 1907. Size 8½ × 5½, pp. xx. and 770. *Maps, Illustrations, and Diagrams. Price* 21*s. net. Presented by the Publisher.* [To be reviewed.]

Phytogeography. *J. Manchester G.S.* **23** (1907): 28–42. **Russell.**
The relation between the geographical position and the productive capacity of land. By Dr. Edward J. Russell. *With Illustrations and Diagrams.*

River terraces. *M.k.k.G. Ges. Wien* **50** (1907): 38–40. **Schaffer.**
Ueber den Zusammenhang der alten Flussterrassen mit dan Schwankungen des Meeresspiegels. Von Dr. Franz Xavier Schaffer.

Sedimentation. *J. Geology* **15** (1907): 238–256. **Mead.**
Redistribution of elements in the formation of sedimentary rocks. By Warren J. Mead. *With Diagrams.*

Seismology. *B. Imp. Earthquake Investigation Com.* **1** (1907): 75–113. **Omori.**
Notes on the Valparaiso and Aleutian earthquakes of August 17, 1906. By Dr. F. Omori. *With Maps and Diagrams.*

Seismology. *G.Z.* **13** (1907): 142–153. **Sapper.**
Die geographische Verbreitung der Erdbeben. Von K. Sapper.

Speleology. **Jeannel and Racovitza.**
Biospéologica. II. Énumération des grottes visitées, 1904–1906 (1re série). Par R. Jeannel et E. G. Racovitza. (*Archives de Zoologie expérimentale et générale*, IVe Serie, Tome vi., No. 8.) Paris, 1907. Size 9½ × 6, pp. 489–536. *Presented by the Authors.*

Speleology. **Racovitza.**
Essai sur les problèmes biospéologiques. Par Émile G. Racovitza. (*Archives de Zoologie expérimentale et générale*, IVe Série, Tome vi, No. 7.) Paris, 1907. Size 9½ × 6, pp. 371–488. *Presented by the Author.*

Terrestrial Magnetism. **Bauer.**
Recent results of terrestrial magnetic observations. By L. A. Bauer. (Reprinted from the *Technology Quarterly*, vol. **20**, No. 2. June, 1907.) Size 10½ × 7, pp. 170–186. *Maps, Diagram, and Illustration.*

Terrestrial Magnetism. **Bauer.**
Report of the Department of Research in Terrestrial Magnetism. By L. A. Bauer. (Extracted from the Fifth Year-book of the Carnegie Institute of Washington.) Washington, 1907. Size 10 × 7½, pp. 236–242. *Illustrations.*
These two papers include accounts of the magnetic survey of the *Galilee* in the Pacific (*Journal*, vol. **27**, p. 92: **28**, p. 184; **30**, p. 664).

Volcanoes. *Globus* **91** (1907): 277–280, 303–305. **Knebel.**

Theorien des Vulkanismus. Ein Rundblick auf ältere und neuere Lehren. Von Walther von Knebel.

ANTHROPOGEOGRAPHY AND HISTORICAL GEOGRAPHY.

Anthropology—Culture. **Elliot.**

The romance of Savage Life. Describing the life of primitive man, his customs, occupations, language, beliefs, arts, crafts, adventures, games, sports, etc., etc. By G. F. Scott Elliott. London: Seeley & Co., 1908 [1907]. Size 8 × 5, pp. 384. *Illustrations. Presented by the Author.*

Political Geography—Frontiers. **Curzon.**

The Romanes lecture, 1907. Frontiers. By the Right Hon. Lord Curzon of Kedleston. Oxford: Clarendon Press, 1907. Size 9 × 6, pp. 58. *Price 2s. net. Presented by the Publishers.*

BIOGRAPHY.

Amundsen. *Terrestrial Magnetism* **12** (1907): 36. ——

Sketch of life and work of Roald Amundsen.

Buchan. *Scottish G. Mag.* **23** (1907): 427–431. **Mill.**

Dr. Alexander Buchan. By Dr. Hugh Robert Mill.

McLoughlin. **Holman.**

Dr. John McLoughlin, the father of Oregon. By Frederick V. Holman. Cleveland: The A. H. Clark Co., 1907. Size 9½ × 6, pp. 302. *Portraits. Price* $2.50.

The subject of this memoir played an important part in the early opening up of Oregon.

GENERAL.

British Empire. **Paton.**

Handbooks on British Colonies, 1907. Compiled by Walter Paton. London: Emigrants' Information Office, 1907. Size 8½ × 5, pp. [764.] *Maps. Price 2s. Presented by the Emigrants' Information Office.*

British Empire. **Knight.**

Over-sea Britain. A descriptive record of the geography, the historical, ethnological, and political development, and the economic resources of the Empire. By E. F. Knight. (Vol. 1) The nearer Empire: The Mediterranean, British Africa, and British America. London: J. Murray, 1907. Size 9 × 5½, pp. xii. and 324. *Maps. Price 6s. net. Presented by the Publisher.* [See notice on p. 100, *ante*.]

British Museum. ——

The history of the collections contained in the Natural History Departments of the British Museum. Vol. 2. London, 1906. Size 9 × 5½, pp. 782. *Presented by the British Museum (Natural History).*

Educational. **Halkin.**

L'enseignement de la géographie à l'Université de Liége. Par Joseph Halkin. (Travaux du Seminaire de Géographie de l'Université de Liége, Fascicule vi.) Liége, 1907. Size 9 × 6, pp. 40.

Geological Society. **Woodward.**

The history of the Geological Society of London. By Horace B. Woodward. London: Geological Society, 1907. Size 9 × 5½, pp. xx. and 336. *Portraits and Illustrations. Presented by the Author.* [To be reviewed.]

Index. ——

The annual Index to the *Times*, 1906. London *Times* Office, [1907]. Size 10 × 6, pp. 892.

Levant. **Margoliouth.**

Cairo, Jerusalem, and Damascus: three chief cities of the Egyptian Sultans. By D. S. Margoliouth. London: Chatto & Windus, 1907. Size 9½ × 6½, pp. xvi. and 302. *Illustrations. Price 20s. net. Presented by the Publishers.*

Metric System. ——

A Bill to render compulsory the use of the system of weights and measures commonly known as the Metric System. London, 1907. Size 13½ × 8½, pp. 6.

Metric System.

British *v.* Metric weights and measures. Reports of the Conference of

Representatives of the Cotton and allied Trades, and of the Parliamentary Debate on the Weights and Measures (Metric System) Bill. London and Manchester, [1907]. Size 7 × 5, pp. iv. and 62. *Map.*

Nature-study. **Carey.**

The mammoth hunters. By Alfred E. Carey. London: Greening & Co., 1907. Size 8 × 5, pp. xii. and 306. *Illustrations. Price 6s. Presented by the Author.*

Place-Names.

Third report of the United States Board on geographic names, 1890–1906. Washington, 1907. Size 9 × 6, pp. 182.

Embodies all the decisions of the Board from 1890 to 1906. Among forms adopted are: Riu-kiu; Rainier (not Tacoma); Everest (not Gaurisankar); Foochow (not Fuchau, yet we find "Fukien" on the next page). Meares' name "Cape Disappointment" is retained for the cape at the Columbia river, but the date of his voyage and the ship in which it was made are wrongly given.

Plant-distribution. **Guppy.**

Plant-distribution from an old standpoint. By H. B. Guppy. Size 8½ × 5½, pp. 34. *Presented by the Author.*

NEW MAPS.

By E. A. REEVES, *Map Curator*, R.G.S.

EUROPE.

Austria-Hungary. **Artaria.**

Artaria's Eisenbahnkarte von Österreich-Ungarn mit Stationsverzeichnis, 1908. Vierte Neubearbeitung, viii. Auflage. Scale 1:500,000 or 1 inch to 7·8 stat. miles. Vienna: Artaria & Co., [1907]. *Price* 2.20 *kr. Presented by the Publisher.*

British Isles. **Royal Commission for Canals and Waterways.**

Map of the canal systems and navigable rivers of England and Wales. Scale 1:633,600 or 1 inch to 10 stat. miles. 2 sheets.—Map of the canals and navigable rivers in the catchment basins of England and Wales. Scale 1:633,600 or 1 inch to 10 stat. miles. 2 sheets.—Map of the canal systems and navigable rivers of Scotland. Scale 1:633,600 or 1 inch to 10 stat. miles.—Map of the canals and navigable rivers of Ireland. Scale 1:633,600 or 1 inch to 10 stat. miles. Southampton: Ordnance Survey Office, 1905–07. *Presented by the Royal Commission on Canals and Waterways.*

The 16-miles-to-an-inch Ordnance Survey maps of the British Isles forms the basis of these canal maps. They are printed lightly in brown and blue, and upon them the special information connected with catchment basins, canals and navigable rivers is given in different colours and symbols. Against the names of the principal cities and towns, as well as the counties, the population is stated in clear figures. The maps have been specially prepared at the Ordnance Survey Office to accompany the report of the Royal Commission on Canals and Waterways. On the map of England showing catchment basins, the average rainfall is given in figures for various districts, the authority for the necessary information being Dr. H. R. Mill.

England and Wales. **Ordnance Survey.**

Sheets published by the Director-General of the Ordnance Survey, Southampton, from December 1 to 31, 1907.

2 miles to 1 inch:—

Large-sheet series, printed in colours, folded in cover or flat in sheets, 11, 16. *Price, on paper, 1s. 6d.; mounted on linen, 2s.; mounted in sections, 2s. 6d. each.*

1 inch (third edition):—

In outline, 101, 111, 140, 158, 336, 352. 1*s. each* (engraved).

With hills in brown or black, 101, 111, 123, 140, 156, 158, 336, 352. 1*s. each* (engraved).

Towns and country around, with roads printed in colour, folded in cover or flat in sheets. Bristol. *Price, on paper, 1s.; mounted on linen, 1s. 6d.*

Large-sheet series, printed in colours, folded in cover or flat in sheets, 1, 2, 3, 4, 5, 6, 7, 8, 9, 94, 122. *Price, on paper, 1s. 6d.; mounted on linen, 2s.; mounted in sections, 2s. 6d. each.*

6-inch—County Maps:—

Carmarthenshire (First Revision), 39 N.E., S.W., 45 S.W., 47 S.W., 48 N.W., N.E. **Cornwall** (First Revision) (13 N.E. and 14 N.W.), 14 S.W., S.E., 19 N.E., 20 N.W., S.E., 32 S.W., S.E., 39 N.W., 40 N.E., 50 S.E., 52 N.W. **Devonshire** (First Revision), 111 S.W., 129 N.E. **Kent** (Second Revision), 48 N.W., S.W. (58 N.E. 58*a* N.W.). **Lincolnshire** (First Revision), 18 N.W., S.W., S.E., 70 N.W., S.W **Pembrokeshire** (First Revision), 6 S.W., 11 N.E., 18 N.E., 29 N.W., N.E., 36 S.W. **Yorkshire** (First Revision of 1891 Survey), 238 S.W., 248 N.E., S.E., 249 S.W., S.E., 259 N.E., 260 S.E., 261 N.E., 262 N.W., 266 N.W., 278 S.E. 1*s. each.*

25-inch—County Maps:—

Cornwall (First Revision), LXI. 9, 10, 13, 14, 15; LXI*a*. 16; LXII. 2, 3, 7, 10, 11; LXIV. 14; LXVIII. 2; LXX. 6, 7, 8, 10, 11, 12, 14, 15, 16; LXXI. 4, 12; LXXVI. 4, 7, 8, 11, 12, 14, 15; LXXVII. 1, 5, 9, (11 and 16), 13, 14 (16 and 11); LXXX. 2, 3, 4; LXXXI. 1. **Kent** (Second Revision), XXXIV. 5, 9, 13; XLIV. 4; XLV. 1; LXIV. 6, 9, 10, 12, 13, 16; LXV. 9; LXXI. 2, 3, 4, 6, 7, 10, 11; LXXII. 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 14, 15, 16; LXXX. 2, 3, 4, 6, 7, 8, 10, 11, 12; LXXXI. 5. **Lancashire** (First Revision of 1891 Survey), CII. 7; CVII. 9, 10, 11, 13, 14, 15. **Lincolnshire** (First Revision), V. 4, 8, 11; VI. 1, 7; XIII. 7, 8, 11; XIV. 9, 13, 14. 3*s. each.* V. 6. 1*s.* 6*d.* **Norfolk** (First Revision), LXIII. 3, 7, 8, 10, 11, 12, 14, 15, 16; LXIV. 1, 5. **Pembrokeshire** (First Revision), IV. 5, 13, 14; V. 5, 6, 9, 10, 14; IX. 1, 2, 4, 11; X. 1, 2, 5, 6; XXI. 2, 5, 6, 11, 12, 15, 16; XXVI. (4 and 3), 8, 12; XXVII. 8. **Yorkshire** (First Revision of 1891 Survey), CCXX. 8; CCXXI. 1, 2, 4, 5, 8, 9, 12, 13, 14, 15, 16; CCXXXII. 5, 9, 10, 11, 12, 13, 14, 15, 16; CCXXXIII. 7, 9, 10, 13, 14; CCXXXV. 10, 12, 13. 3*s. each.*

(*E. Stanford, London Agent.*)

Europe—Central. **K. Preussische Landesaufnahme**

Topographischen Specialkarte von Mittel-Europa. Herausgegeben von der kartographischen Abtheilung der Königl. Preussischen Landesaufnahme. Scale 1 : 200,000 or 1 inch to 3·1 stat. miles. Sheets: 299, Dordrecht; 301, Wesel; 328, Ghent; 330, München-Gladbach. Berlin: K. Preüssische Landesaufnahme, 1907. *Price* 1.00*m. each sheet.*

Europe—Central. **Ravenstein and Liebenow.**

Ravenstein-Liebenow's Special- Rad- und Automobilekarte von Mittel-Europa. Scale 1 : 300,000 or 1 inch to 4·7 stat. miles. Sheets: 108, Sanok; 122, Kaschau; 136, Miskolcz; 150, Debreczen; 160, Graz; 161, Steinamanger; 163, Kecskemet; 164, Csaba. Frankfurt-am-Main: Ludwig Ravenstein, [1907].

France. **Ministre de l'Interieur, Paris.**

Carte de la France dressée par ordre du Ministre de l'Intérieur. Scale 1 : 100,000 or 1 inch to 1·6 stat. mile. Sheets: iii.–17, Pont-l'Abbé; xii.–11, Le Hâvre (sud): xiii.–13, Laigle; xiii.–14, Martagne; xiii.–37, Bagnères-de-Luchon; xv.–12, Les Andelys; xviii.–20, La Charité; xx.–29, Le Monastier; xxiv.–23, St. Claude; xxvi.–24, Vallorcine. Paris: Ministère de l'Intérieur, Service Vicinal, 1907. *Price* 0.80 *fr. each sheet.*

Greece. **Marées.**

Karte des Sundes zwischen Leukas und Akarnanien. Reduktion nach der Aufnahme von Hauptmann v. Marées im März u. April 1905. Scale 1 : 50,000 or 1·3 inch to 1 stat. mile. *Petermanns Mitteilungen*, Jahrgang 1907, Tafel 20. Gotha: Justus Perthes, 1907. *Presented by the Publisher.*

ASIA.

Java. **Topographische Inrichting, The Hague.**

Topographische Kaart der Residentie Soerakarta. Scale 1 : 100,000 or 1 inch to 1·6 stat. mile. 6 sheets. The Hague: Topographische Inrichting, 1906.

The 1894 edition of this map with the tramways revised to 1906.

AFRICA.

Africa. **Topographical Section, General Staff.**

Map of Africa. Compiled in the Topographical Section, General Staff. Scale 1 : 250,000 or 1 inch to 3·9 stat. miles. Sheets: Somaliland, 68–G, Biyo Kaboba; 68–H, Harag Jid; 68–I, Bulhar; 68–M, Harrar; 68–N, Jifar Medir; 68–O, Adadleh. London: Topographical Section, General Staff, War Office, 1907. *Price* 1*s.* 6*d. each sheet. Presented by the Director of Military Operations.*

Angola. **Griffiths & Co.**

Benguella Railway. Plan showing railway from Lobito bay to 750 kilometres.

Scale 1 : 400,000 or 1 inch to 6·3 stat. miles. London : Griffiths & Co., [1907]. *Presented by the Publisher.*

A black-and-white lithograph of a traverse along the line of the proposed railway from Lobito bay, near Benguela, into the interior for a distance of 750 kilometres (466 miles). The line to be followed by the railway is shown as well as the country for about 10 miles on either side.

Egypt. **Survey Department, Cairo.**

Topographical map of Fayum Province. Scale 1 : 10,000 or 6·3 inches to 1 stat. mile. Sheets : s.w. 12–1, 12–6, 12 and 13–3, 13–2, 13–4, 14–2, 14–3, 14–4, 14–5, 14–6, 15–2, 15–3, 15–4, 15–5, 15–7. Cairo : Survey Department, 1907. *Presented by the Director-General, Survey Department, Cairo.*

Morocco. **Larras.**

Carte de reconnaissance du Maroc, levées et dessinées par le Capitaine N. Larras, 1898–1906. Scale 1 : 250,000 or 1 inch to 3·9 stat. miles. Sheets : Casablanca, Safi-Marrakech. Paris : Henry Barrère, [1907].

These are the first two sheets of a new large-scale map of parts of western and central Morocco, compiled chiefly from surveys and sketches by Captain N. Larras. There will be altogether seven sheets, which are to include all the more important districts of the country. The map is printed in colours, relief being shown by horizontal form lines in brown, at approximating intervals of 50 metres. On the present sheets are inset plans of Casablanca and Safi, on the scale of 1 : 10,000.

South Africa. **'South Africa.'**

The railway map of South Africa. Scale : 1 : 4,000,000 or 1 inch to 63·1 stat. miles. London : Offices of *South Africa*, 1907.

This railway map, which has been revised to date, is published as a supplement to the number of *South Africa* for November 23, 1907.

AMERICA.

Chile. **Boloña and Bertrand.**

Nuevo mapa de Chile. Formado con arreglo a los datos oficiales mas recientes i los últimos levantamientos efectuados por las Comisiones de Límites. Por Nicanor Boloña. Revisado i aprobado por el injeniero Sr. Alejandro Bertrand, Jefe de la Oficina Demarcadora de Límites. Scale 1 : 2,000,000 or 31·6 stat. miles to an inch. Santiago : Carlos Tornero, 1904.

Chile. **Direccion de Obras Publicas, Santiago.**

Carta jeográfica y minera de los 31° 30′ á 33° 10′ de Lat. Sur. que comprende la Provincia de Aconcagua y parte de las de Coquimbo, Valparaiso y Santiago. Levantada y construida por la Seccion de Jeografica y Minas de la Direccion de Obras Públicas. Publicado bajo la direccion del Sr. José del C. Fuenzalida. Scale 1 : 100,000 or 1 inch to 1·6 stat. mile. 6 sheets. Santiago : Direccion de Obras Públicas, 1905.

This map marks a decided advance in the cartography of Chile. It includes the whole of the country from the coast-line to the eastern boundary lying between the parallels of 31° 30′ and 33° 10′ S. lat., and thus embraces Valparaiso and the line of the trans-Andine railway, as well as the peak of Aconcagua. Relief is shown by contour-lines in brown at 100-metre intervals, the 500-metre contours being distinguished by a dotted line, and the 1000-metre by a thick line, which arrangement greatly assists the eye in following the lines. These contours can only be considered as approximately correct in many places, but they serve well to give a good general idea of the relative heights of land. In addition to the contours, absolute heights are shown in black figures. Water is shown in blue, and boundaries red. Useful information concerning location of minerals is given on the map by various symbols, and taken altogether the map is a most creditable production. In the Andine region the surveys of the recent Boundary Commission have formed a good basis for the topographical features. The height of the peak of Aconcagua is given as 7004 metres (22,979 feet), but it may be pointed out that by the latest trigonometrical determination of Fr. Schrader it is 22,812 feet.

Chile. **Oficina de Límites, Santiago.**

Comision Chilena de Límites. Scale 1 : 250,000 or 1 inch to 3·9 stat. miles. Sheets : Atacama. Santiago : Oficina de Límites, 1907. *Presented by the Oficina de Límites, Santiago.*

These two sheets deal with the northern section of the Chilo-Argentine boundary, and include the region bordering on the Atacama desert between 27° and 29° S. lat.

and 68° and 70° 50′ W. long. In addition to the topographical sheets, there are, as before, skeleton sheets showing the lines of traverses and triangulation.

United States. **U.S. Geological Survey.**

Geologic atlas of the United States. Scale 1 : 125,000 or 1 inch to to 1·9 stat. mile. Folios : 141, Bald mountain—Drayton, Wyoming; Cloud peak—Fort McKinney, Wyoming; Nantahala, North Carolina—Tennessee; Amity, Pennsylvania; Lancaster—Mineral Point, Wisconsin—Iowa—Illinois; Rogersville, Pennsylvania; Pisgah, North Carolina—South Carolina; Joplin district, Missouri—Kansas; Penobscot bay, Maine; Devil's Tower, Wyoming. Washington : Department of the Interior, U.S. Geological Survey, 1906–07. *Price 25 cents. each folio. Presented by the United States Geological Survey.*

AUSTRALASIA.

Queensland. **Ball.**

Copper-mining district of Cloncurry, North-Western Queensland. Based on Queensland 4-mile map issued by Department of Public Lands, and showing freeholds and mineral leases. Compiled from official and other sources, under the supervision of L. C. Ball, B.E., Assistant Government Geologist. Scale 1 : 380,160 or 1 inch to 6 miles. Brisbane : Queensland Geological Survey, 1907.

POLAR REGIONS.

South Georgia. **Szielasko.**

Karte der Cumberland Bay (Süd-Georgien). Von A. Szielasko. Scale 1 : 125,000 or 1 inch to 1·9 stat. mile. *Petermanns Mitteilungen*, Jahrgang, 1907, Tafel 21. Gotha : Justus Perthes, 1907. *Presented by the Publisher.*

GENERAL.

World. **Freytag.**

G. Freytag's Welt-Atlas. Dritte, vermehrte Auflage. Vienna and Leipzig : G. Freytag & Berndt, 1908. *Presented by the Publisher.*

A new edition of a small pocket atlas, with additions and corrections. The maps vary considerably in merit, and in some, as No. 50, the imperfect registering of the colours seriously interferes with their clearness.

World. **Harmsworth.**

Harmsworth Atlas and Gazetteer. Parts 30 & 32. London : The Amalgamated Press, Limited, 1907–8. *Price 7d. each part.*

These parts contain the following maps :—Part 30 : Nos. 85–86, Balkan States and Asia Minor (industries and communications); 131–132, Asiatic Russia; 143–144, Central Africa. Part 31 : Nos. 87–88, Turkey in Europe; 181–182, Mexico and Central America; 193–194, South America (south). Part 32 : Nos. 89–90, Greece, Crete, and the Archipelago; 141–142, Egypt and the Sudan; 163–164, Central Canada.

World. **St. Martin and Schrader.**

Atlas Universel de Géographie construit d'après les sources originales et les documents les plus récents, cartes, voyages, mémoirs, travaux géodesiques, etc., avec un texte analytique. Ouvrage commencé par M. Vivien de Saint-Martin et continué par Fr. Schrader. Sheet No. 68, Afrique Australe. Paris : Hachette et Cie., 1907. *Presented by the Publisher.*

A glance at the letterpress which accompanies this sheet will show that the best and most reliable documents have been utilized in the compilation. Like all the other sheets of this atlas, the drawing and engraving are excellent, but it would certainly be an improvement in general effect, and render the names more clearly legible, if the hill work could be printed in brown instead of black.

CHARTS.

Admiralty Charts. **Hydrographic Department, Admiralty.**

Charts and Plans published by the Hydrographic Department, Admiralty, during November, 1907. *Presented by the Hydrographer, Admiralty.*

New Charts.

No.	Inches.	
3676 m	= 0·9	United States, east coast :—Fletchers neck to Merrimac river. 3s.
3678 m	= 7·9	British Columbia :—Port Simpson. 3s.

No.	Inches.	
3660 m	= 11·8	Gulf of Aden:—Aden harbour. 3*s.*
7 m	= 2·9	Gulf of Aden:—Aden harbour and approaches. 4*s.*
3666 m	= 0·3, 3·9, 5·9	East coast of Korea:—Fusan harbour to Chukupen bay. Chukupen bay. Chukusan po. 3*s.*

Charts Cancelled.

No.	Cancelled by.	No.
7 Gulf of Aden:—Aden and adjacent bays, Aden anchorage.	New chart. Aden harbour and approaches	7
54 Ports and anchorages on the east coast of Korea:—Plan of Cheku-pien bay on this sheet.	Plan of Chukupen bay on new chart . . .	3666

Charts that have received Important Corrections.

No. 240, England, south coast:—Hamoaze. 2682, England, west coast:—Nash point to New passage. 1538, Ireland, west coast:—Foynes harbour. 2049, Ireland, south coast:—Kinsale to Wexford. 2241, Baltic:—Entrance to gulf of Finland and northern entrance to the gulf of Riga. 2285, Black sea:—Varna, Baljik bay. 233, Africa, north coast:—Suez canal. 330, North American lakes:—Lake and river St. Clair with the Detroit river. 612, North America, east coast:—Little Spoon island to Pemaquid point. 2853, Gulf of Mexico:—Mississippi sound and Mobile bay. 229, United States, west coast:—Point Pinos to Bodega head. 2172, Alaska:—Bering strait. 623, Africa, west coast:—Fernando Po island. 2404, Singapore main street from Tree island to Batam bay. 2023, Singapore:—Keppel harbour. 1199, China, east coast:—Kue shan islands to the Yang tse Kiang. 1601, China, north-east coast:—Wusung river. 3412, Tasmania:—Hunter passage. 781, Pacific ocean:—North-west sheet. 783, Pacific ocean:—South-east sheet. 2460, Pacific ocean:—Kamchatka to Kadiak island, etc.

(*J. D. Potter, Agent.*)

Indian Ocean and Red Sea. **Meteorological Office.**

Monthly meteorological charts of the Indian Ocean north of 15° S. lat. and Red Sea, January, 1908. London: Meteorological Office, 1907. *Price 6d. each. Presented by the Meteorological Office.*

North Atlantic and Mediterranean. **Meteorological Office.**

Monthly meteorological charts of the North Atlantic and Mediterranean, January, 1908. London: Meteorological Office, 1907. *Price 6d. each. Presented by the Meteorological Office.*

North Atlantic. **U.S. Hydrographic Office.**

Pilot chart of the North Atlantic Ocean, December, 1907. Washington: U.S. Hydrographic Office, 1907. *Presented by the U.S. Hydrographic Office.*

North Pacific. **U.S. Hydrographic Office.**

Pilot chart of the North Pacific Ocean, January, 1908. Washington: U.S. Hydrographic Office, 1907. *Presented by the U.S. Hydrographic Office.*

PHOTOGRAPHS.

Canada. **Firth, Holmden, and Jones.**

Thirty-six photographs of North-Western Canada, taken by Messrs. J. F. Firth, S. M. Holmden, and H. W. Jones. *Presented by A. H. Harrison, Esq.*

Collected by Mr. Harrison during his recent journey in North-Western Canada, and on his return, presented by him to the Society.

(1) Mr. H. Firth and his wife; (2) A creek just before the freeze-up, Fort McPherson; (3) Gorge in the Davidson range; (4) Indians on the Peels river; (5) Natives arriving at Fort McPherson for spring trade; (6) *Midnight Sun* seen from Fort McPherson; (7) Hay river post, new buildings by Mr. Marsh; (8) Fort McPherson, looking across Peels river; (9 and 10) A lake near Peels river; (11) The Firth family, Fort McPherson; (12) H.B. Co.'s transport starting for Herschell island from Fort McPherson; (13) J. F. Firth and his dogs; (14) H. Firth and his dogs; (15) Wild roses, Fort Simpson; (16) At Fort Simpson, June 12, 1905; (17) Wrigley harbour;

(18) A whale-boat being towed up Peels river; (19) Fort Simpson; (20) The back of Fort Simpson; (21) H.B. Co.'s steamer at Wrigley harbour; (22) Protestant Mission at Fort Norman; (23) Pelican rapid, Fort Smith; (24) The Ramparts above Good Hope; (25) An old Indian woman making a tent; (26) The *Wrigley* taking wood aboard; (27) Roman Catholic mission at Fort Simpson; (28) Indian family at Fort Simpson; (29) Indian camp, Mackenzie river; (30) The "Huskies'" boats at anchor in the Peels river; (31) Natives and "Huskies" of Fort McPherson; (32) "Huskies" on the bank of Peels river; (33) The inhabitants of Fort McPherson coming out of church; (34) The *Midnight Sun* at Fort McPherson; (35) Fort McPherson; (36) The Indian post of Fort McPherson.

Canada. **Hammerstein.**

Fifty-seven photographs of the Athabasca river, Canada, taken by Count Von Hammerstein. *Presented by A. H. Harrison, Esq.*

These photographs were brought home by Mr. A. H. Harrison on his return from his recent surveying expedition in the neighbourhood of the delta of the Mackenzie. They are representative of the mode of life and scenery in this part of North-West Canada.

(1–24) Views on the Athabasca river; (25) Cascade on Athabasca river; (26) Making portage, Athabasca river; (27) A Peterborough canoe on the Athabasca river; (28) Boat's crew, Athabasca river; (29 and 30) Skow on Athabasca river; (31) Tracking up-stream; (32 and 33) Fort Chipewyan; (34) Fort McMurray; (35) Camp at Fort McMurray; (36) Police-waggon on the trail; (37) The *Midnight Sun* on the Athabasca river; (38) Cree Indian coming in with meat; (39) Lake Athabasca, trading-post; (40) Rapids, Slave river; (41–43) Salt plains; (44–54) Boring for oil, Athabasca river; (55) Machinery on the bank of the Athabasca river; (56) Athabasca landing, putting machinery on board Skow; (57) Taking machinery ashore, Athabasca river.

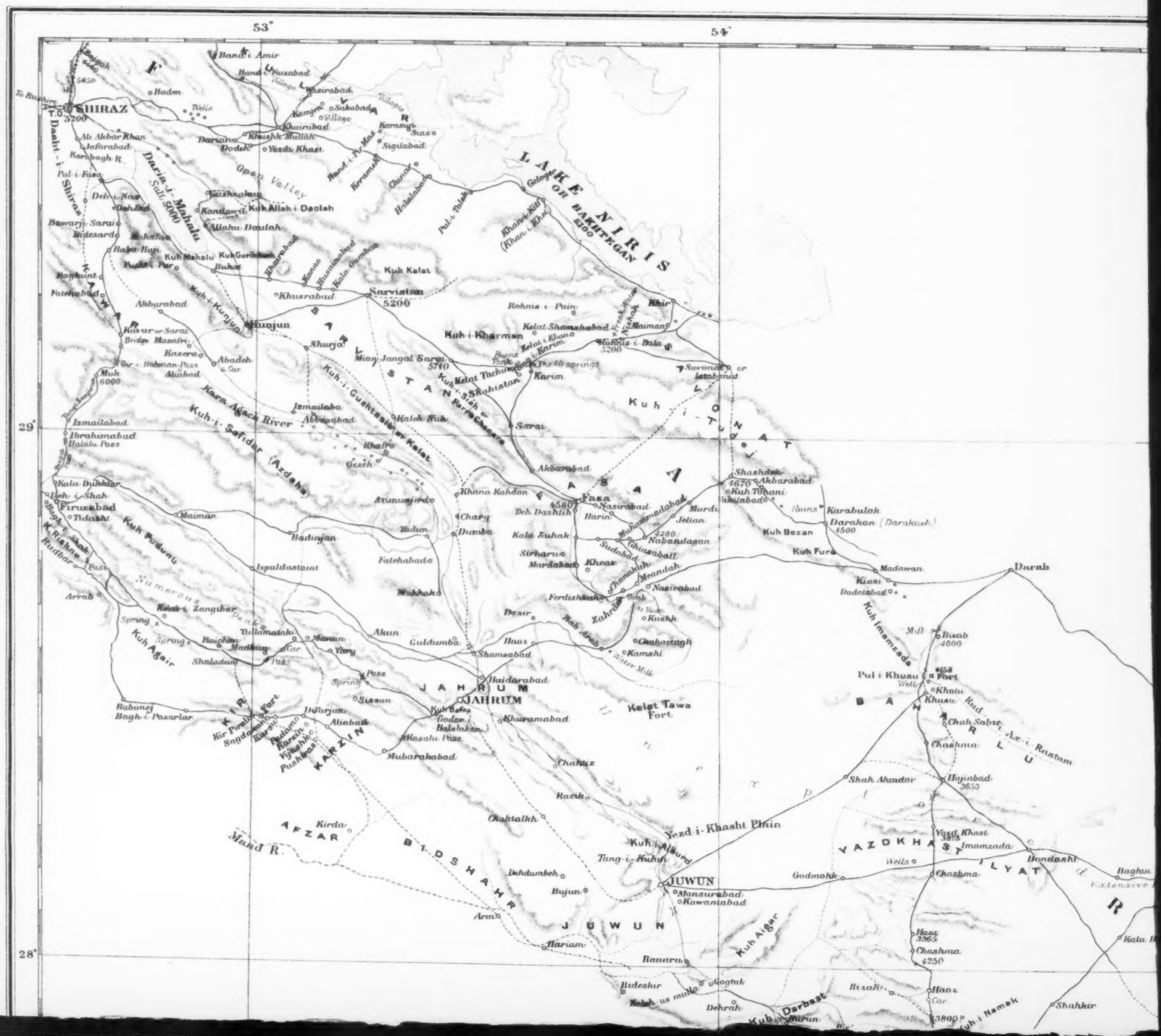
Canada. **Harrison.**

Eighty-two photographs of North-West Canada, taken by A. H. Harrison, Esq. 1905–7. *Presented by A. H. Harrison, Esq.*

Mr. Harrison's journey and explorations, during which these photographs were taken, were described by him at a recent meeting of this Society. His lengthy stay at the delta of the Mackenzie gave him exceptional opportunities for photography in addition to his survey work, and these he fully availed himself of, as will be seen from the following list. The circumstances under which the views were taken were at times anything but favourable, and the results are quite as good as might be expected; in fact, some of the views are remarkably clear, and as lantern-slides were most effective, as those who attended his lecture will remember.

(1–4) Whaling captains; (5–7) Whaling crews; (8) Feeding dogs on board ship; (9) Summer scene, Herschel island; (10–15) Ships frozen in, Herschel island; (16 and 17) Eskimo camp; (18–20) Eskimo camp in the mountains; (21) Eskimo with load of deer meat; (22) Two Eskimo hunters; (23) Eskimo graveyard, Herschel island; (24) Ice off Cape Bathurst; (25–43) Drifting ice between Cape Kellet and Herschel island, August, 1906; (44) Arrival of steamer, Fort McPherson; (45) Travelling on the Arctic ocean; (46) Jacki in his kayak; (47) Kokatu fishing; (48) First camp in the spring; (49) Whale-boats going up Mackenzie river; (50) Our last camp on Mackenzie; (51 and 52) Indians travelling; (53) The back of my winter camp; (53) Natives of Arctic ocean; (54–59) No titles given; (60) Indian coming in with fish; (61) Nuns visiting the Indians; (62) Slave Indians in camp; (63) Mission steamer, Mackenzie river; (64 and 65) A robin's nest, Fort Simpson; (66) Flood; (67–69) Roman Catholic school, Fort Providence; (70) Building the boat *Midnight Sun*; (71) The Hay river post; (72) Group of Eskimo, Herschel island; (73) Athabasca landing; (74) Mission at Fort Providence; (75) The *Midnight Sun*, Fort McPherson; (76) Woolferine rock, Mackenzie river; (77) Red river post, Athabasca river; (78) Roman Catholic mission, Lesser Slave lake; (79) Church, Fort Resolution; (80) Eskimo in camp; (81) Group of Eskimo, Herschel island; (82) Edmonton.

N.B.—It would greatly add to the value of the collection of Photographs which has been established in the Map Room, if all the Fellows of the Society who have taken photographs during their travels, would forward copies of them to the Map Curator, by whom they will be acknowledged. Should the donor have purchased the photographs, it will be useful for reference if the name of the photographer and his address are given.


53°
54°
29°
28°
SHIRAZ
Band i Amir
Piruzabad
Nasirabad
Sakabad
Khairabad
Khushk Mullah
Yazdu Khast
Siqilabad
Halalabad
Kuh Kalat
Sarvistan
5200
Khusrabad
Kuh i Kharman
Kala Dukhtar
Piruzabad
Kuh Pudowu
Kuh Agair
Kuh i Safidar (Ardeha)
Kara Aiack River
Ismailabad
Ibrahimabad
Halalu Pass
Akbarabad
Abbasabad
Kuh i Gushtasbi or Kalat
Kuh i Shah Parra Chenara
Kuh i Lotuft
Fasa
Nasirabad
Akbarabad
Shahdez
1670
Kuh Tuhani
Karabulak
Darakan (Darakuch)
4500
Kuh Bezan
Kuh Furg
Madawan
Durab
Kuh Imamzada
Dizab
4000
Pul i Khusu
Khusu
Chah Sabz
Chashma
Shah Ahmadar
Hajiabad
3653
Yazdkhast
Imamzada
Dondasht
Godmokk
Chashma
Baghan
Yezd i Khasht Plain
Kuh i Alburz
Tang i Kuhuh
JUWUN
Mansurabad
Kawamabad
Kuh Algar
Haoz
3965
Chashma
4250
Haoz
Car
Kala
Shahkar
Kuh i Namak
Darbast
Jahrum
Kaleat Tawa
Fort
Khuramabad
Kaleat Shamsabad
Kaleat Karim
Kaleat Tachuk
Kuh i Sahistan
Karim
Saraz
Khana Kahdan
Chang
Dumba
Kala Zuhak
Sirharu
Mardabad
Kheaz
Nasirabad
Ferdushkah
Zahra
Kushk
Chahartagh
Kamahi
Shamsabad
Haidarabad
Khuramabad
Mubarakabad
Chahtaz
Kazak
Chahtalkh
Dehdumbeh
Bujun
Arm
Harjam
Ramrud
Budeshur
Kuh
Dehrah
Kuh i Darbast
Kuh i Namak
Kirda
Maud R.
AFZAR
BIDSHAHR
KARZIN
Khaleh
Rudbar
Numerous Springs
Kaleat Zangibar
Shaladum
Babunej
Bagh i Pasarlar
Kir Firuzi
Sayd Ahmadi
Kaz
Padam
Karzin
Vijeshk
Pushkwar
Fort
Kuh Safeda
Kuh Bafeq
Godar i Halehkan
Masalu Pass
Kuh Allah i Daolah
Kuh Mahalu
Kuh Gurbasi
Kuh i Kunjun
Kuh i Sefid
Kuh i Kharman
Kuh i Alburz
Kuh Algar
Kuh i Namak
Darbast
Open Valley
Daulat i Shiraz
Daulat i Mahalu
Salt SPRING
Karabagh R.
Pul i Fasa
Deh i Nau
Deh Bid
Beware Sarai
Bidzard
Kahalun
Baba Han
Fatehabad
Haghaint
Kuhsar or Sarai
Bridge Masafir
Kaseera
Abadeh
Car
Rahman Pass
Alinabad
Muk
6000
Ismailaba
Khalifa
Gezeh
Arunujird
Maiman
Nadinjan
Ispaldastaun
Fatehabad
Mukhako
Arrab
Akun
Guldumba
Haoz
Shamsabad
Tillamanka
Manun
Madhuy
Car
Shaladum
Pass
Spring
Kaichan
Siasan
Kuh Safeda
Godar i Halehkan
Masalu Pass
Khuramabad
Mubarakabad
Alinabad
Dhurjan
Kaleat Tawa
Fort

THE GEOGRAPHICAL JOURNAL 1908.

55° 56°

PERSIA

COUNTRY BETWEEN

BANDAR ABBAS AND SHIRAZ

From sheets 88 & 89 of the 8 miles to an inch Survey of India Map of South Western Asia (Persia), with additions and corrections from Plane Table and Prismatic Compass Traverses.

by

LIEUTENANTS A.T. WILSON AND A.H.P. CRUICKSHANK.
32nd Sikhs Pioneers I.A.

1907.

Scale 1 : 1000,000 or 1 Inch = 15·78 Stat. Miles.

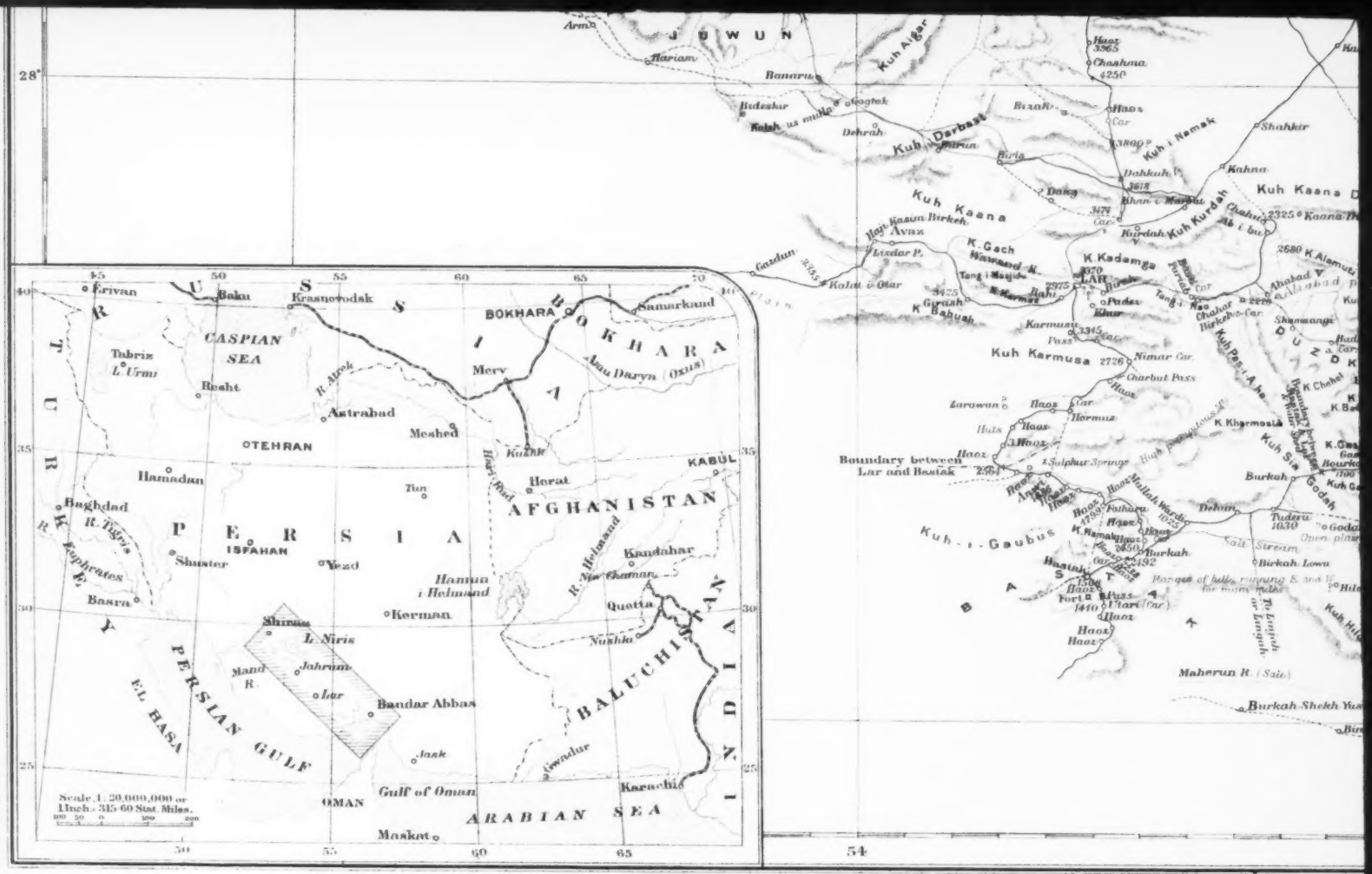
10 8 6 4 2 0 10 20 30 40 50

29°

Reference.

Car. *Caravanserai only*
C. *Water cistern only*
V. *Village.*
Date grove.
Haus *Tank or Reservoir*
Roads
Heights in feet.
Route of Lieutenants Wilson & Cruickshank

Forg
Bagtan
Extensive Plain
R
Kala Bikui
28°
Kala Bikui



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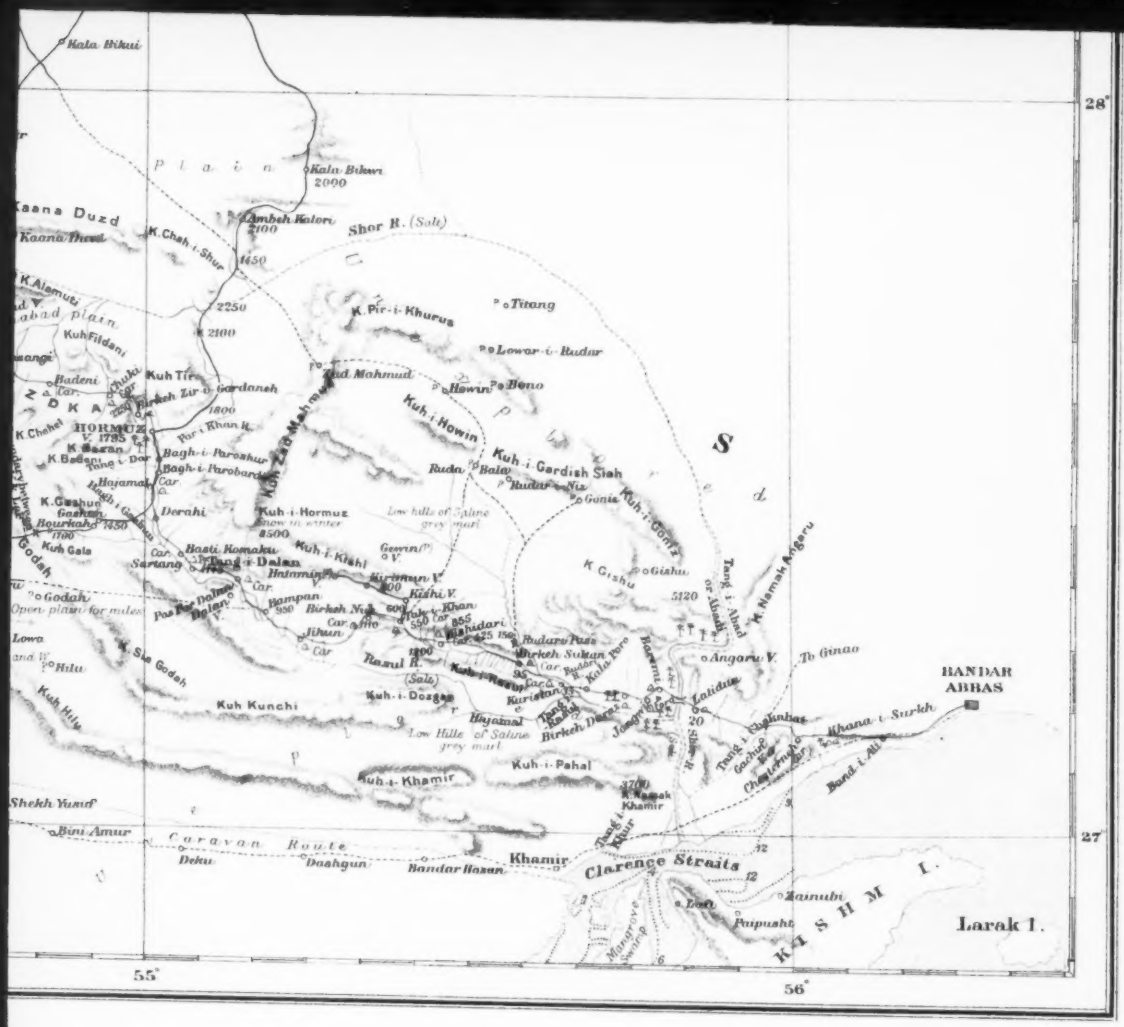
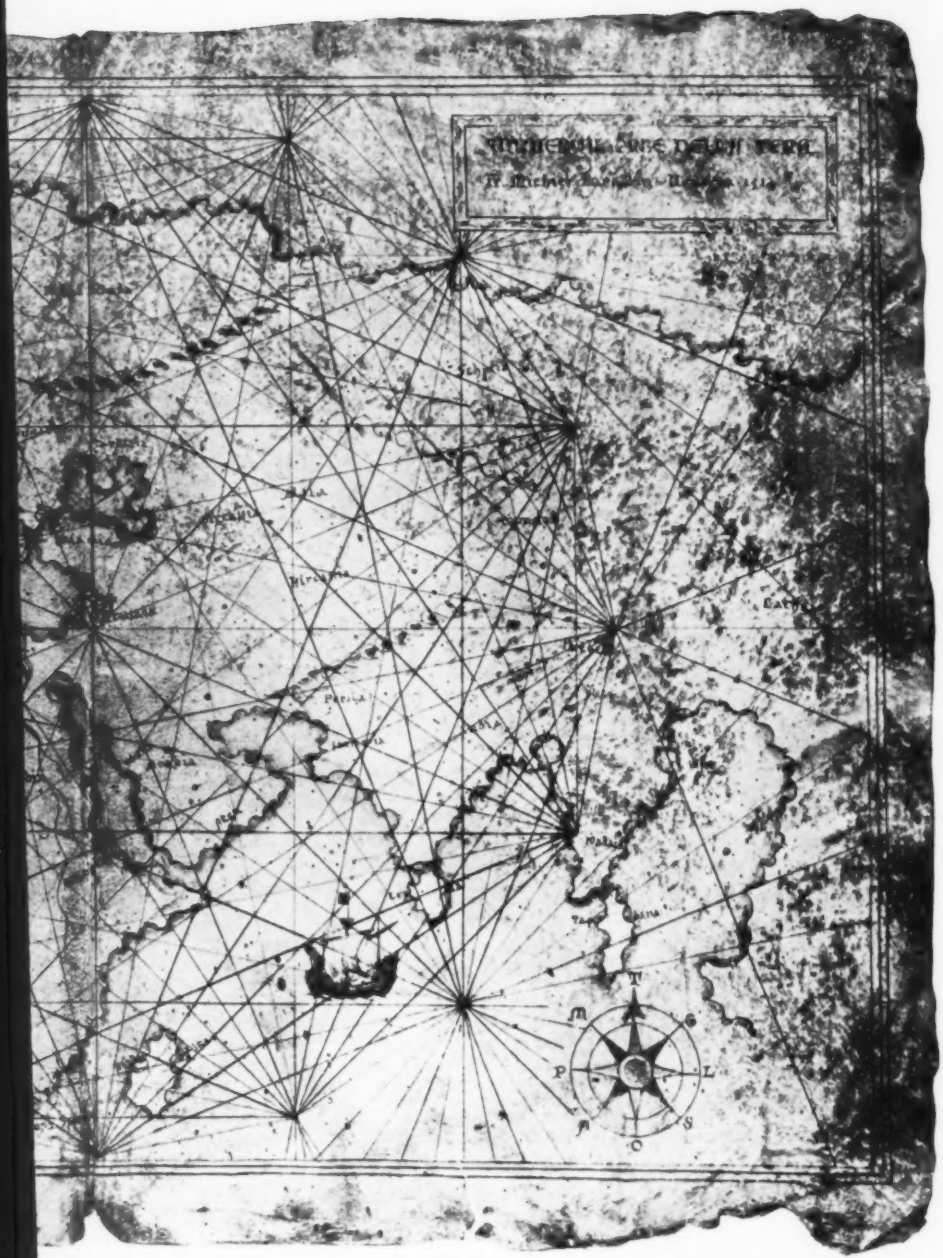

Kala Bikui
Kaana Duzd
Kaana Thard
K. Alamuti
Kuh Fildani
Badeni
Kuh Tire
Gardaneh
Birkeh Zir
K. Chahel
HORMUZ
V. 1795
K. Bagan
Bagh-i-Paroshur
Bagh-i-Parobardeh
Hajamak
K. Gushur
Gaskun
Bourkan
1450
Kuh Gala
Godah
Open plain for miles
Lowa
Hilu
K. Sia Godah
Kuh Hills
Kuh Kunchi
Shekh Yusif
Bini Amur
Caravan Route
Deku
Dashgun
Bandar Hasan
Khamir
Clarence Straits
Kala Bikui
2090
Kambeh Kalori
2100
Shor R. (Salt)
1450
K. Chah-i-Shur
2250
K. 2100
K. Pir-i-Khurus
Titang
Lower-i-Rudar
Jad Mahmud
Howin
Beno
Kuh-i-Howin
Kuh-i-Gardish Siah
Rudar
Baka
Gonis
Kuh-i-Gonis
Kuh-i-Hormuz
Snow in winter
8500
Derahi
Basti Komaku
Serang
Tang-i-Dalan
Kuh-i-Kushi
Gemin (?)
Hormuz V.
Kizhi V.
Hampan
Birkeh Nisi
Kuh-i-Khan
Jihun
Rudari
Rudars Pass
Birkeh Sultan
Kala Boro
Rasul R.
(Salt)
Kuh-i-Rasul
Kuh-i-Dozgan
Kuristan
Tang-i-Rasul
Hajamal
Birkeh Dez
Jangi
Low Hills of Saline grey marl
Kuh-i-Pahal
Kuh-i-Khamir
Khamir
Tang-i-Khur
Gishu
5120
K. Namak Angaru
Tang-i-Abad or Alush
Angaru V.
To Ginao
Latidia
Tang-i-Chahinbar
Gachin
Chahinbar
Khana-i-Surkh
Bund-i-Ali
BANDAR ABBAS
Zainubi
Pupushi
KISHM I.
Larak I.
28°
27°
55°
56°

MAP OF THE WORLD, BY FR. M. BA



Y FR. M. BARBOLAN, VENICE, 1514.